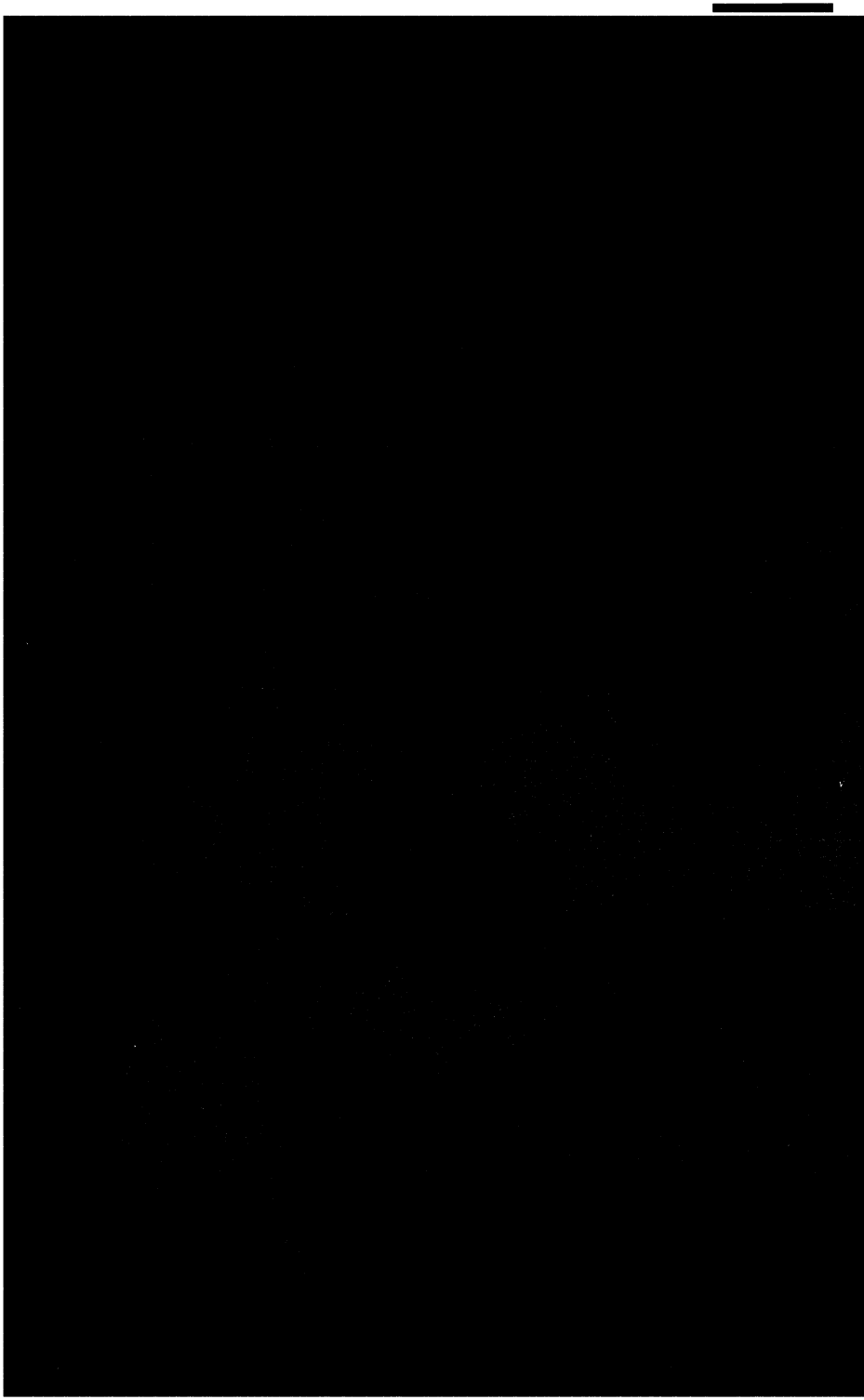

FRONTISPIECE.

1. & 1. a. PAPILIO LAESTRYGONUM. 2. & 2. a. ÆMONA AMATHUSIA. 3. & 3. a. ÆMONA PEALII.

Behari Lal Das del. J. W. M. direxit. West Newman & Co. lith.

THE

BUTTERFLIES

OF

INDIA,

BURMAH AND CEYLON.

A DESCRIPTIVE HANDBOOK OF ALL THE KNOWN SPECIES OF RHOPALOCEROUS LEPIDOPTERA INHABITING THAT REGION, WITH NOTICES OF ALLIED SPECIES OCCURRING IN THE NEIGHBOURING COUNTRIES ALONG THE BORDER; WITH NUMEROUS ILLUSTRATIONS.

BY

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'HOW MUCH KNOWLEDGE IS LOST BY THE SCATTERED FORMS IN WHICH IT IS USHERED INTO THE WORLD! HOW MANY SOLITARY STUDENTS SPEND HALF THEIR LIVES IN MAKING DISCOVERIES WHICH HAD BEEN PERFECTED A CENTURY BEFORE THEIR TIME, FOR WANT OF A CONDENSED EXHIBITION OF WHAT IS KNOWN!'

TO

HIS EXCELLENCY

The Most Honourable The Marquess of Ripon,

K.G., G.M.S.I., G.M.I.E., &c., &c.,

VICEROY AND GOVERNOR-GENERAL OF INDIA,

WHO HAS DEIGNED TO TAKE A KINDLY

INTEREST IN THE PROSECUTION OF THE WORK,

THIS BOOK

IS

BY PERMISSION

MOST RESPECTFULLY DEDICATED.

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NYMPHALIDÆ.

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GLOSSARY OF TECHNICAL TERMS.

ABDOMEN, the section of the body behind the thorax. See p. 10.

ABDOMINAL MARGIN, the inner edge of the hindwing next the body. See p. 11.

ACUMINATE, angled or angular, in contradistinction to rounded. See Pl. XIII, *f.* 30, ♀, apex of forewing of *Cyllogenes suradeva*.

ACUTE, pointed, less than a right angle.

ADPRESSED. See "Appressed."

AENESCENT, bronzed, (*dēnĕus*, of bronze).

ANAL, near or pertaining to the hinder end of the abdomen, (*ānus*, the fundament).

ANAL ANGLE, the angle formed by the inner (or abdominal) with the outer margin in the hindwing. See p. 11 and Pl. I.

ANASTOMOSING, the opening of one vessel or channel into another, (*αναστομουν*, to furnish with a mouth or opening).

ANNULAR, in the form of a ring.

ANNULATIONS, rings, (*annŭlātus*, furnished with a ring).

ANNULATED, ringed.

ANTENNÆ, long, slender appendages of the head. See p. 10 and Pl. I.

ANTERIOR MARGIN, the fore margin of either wing. See p. 11 and Pl. I.

APEX, the tip or summit of either wing, where the anterior and outer margins meet. See p. 11 and Pl. I.

APICAL, at or pertaining to the apex.

APPRESSED, pressed close, (*appr ĭmĕre*, to press to).

AREOLETS, an obsolete term for the spaces between the nervules in the wings.

ARTICULATION, connection by joints; one of the sections of a jointed series, (*artĭcŭlāre*, to divide into joints; *artĭcŭlus*, a little joint, a knuckle).

ATROPHIED, died away, withered, (*ἀτροφέω*, to have no food, to pine away).

BAND, a broad, even stripe.

BASAL, at or pertaining to the base.

BASE, of the wings, the part at or near junction with the body.

BIFID, cleft in two; opening with a cleft, (*bĭfĭndĕre*, to cleave in two).

BIFURCATE, having two prongs like a fork.

BIPUPILLED, with reference to an ocellus, having two central spots or pupils.

BLIND OCELLUS, an eye-like mark on the wing, with the central spot wanting.

BLOTCH, a large, irregular marking.

CARINATE, keeled, (*cărīna*, a keel).

CARTILAGINOUS, tough, of the nature of gristle.

CAUDAL, at or pertaining to the tail, (*cauda*, a tail).

CAUDATE, tailed; furnished with an appendage like a tail.

CELL. See "Discoidal Cell;" also p. 11 and Pl. I. Also occasionally used with reference to the space between any two nervules or nervures.

CHALYBEATE, steely, (*chălybs*, steel).

CHRYSALIS. See p. 9.

CILIA, fine hair-like fringes, chiefly on outer margin of wing, (*cĭlia*, eyelashes).

CINEREOUS, ashy grey, (*cĭnis*, ashes).

CLAVATE, club-shaped, (*clāva*, a club).

CLUB, the knob at the tip of an antenna.

COCOON, the case formed by many caterpillars in which to change into pupæ.

COMMON, when applied to markings as bands, fasciæ, &c., means that they extend to both wings.

COMPRESSED, flattened from side to side, as if by lateral pressure, in contradistinction to depressed or flattened downwards.

CONCAVE, curved inwards, as in the outer margin of forewing of *Cœlites epiminthia*, Pl. XIII, *f.* 31 ; or the scallops in the margin of hindwing of *Papilio læstrygonum*, *see* Frontispiece.

CONFLUENT, running together, *(confluens*, flowing into).

CONGENERIC, belonging to the same genus.

CONSTRICTED, drawn together, or contracted so as to be narrower or smaller at certain points like a string of beads at the intervals between the beads, *(constringĕre*, to draw tight, to strain).

CONTIGUOUS, touching, joining, *(con*, with, *tangĕre*, to touch).

CONVEX, curved outwards, as in the inner margin of forewing of *Euplœa elisa*, ♂, Pl. VIII, *f.* 14.

CONVERGENT, directed towards one point, *(con*, with ; *vergĕre*, to incline).

CORDATE, heart-shaped, *(cor*, the heart).

CORIACEOUS, leathery, *(corĭum*, leather).

CORNEOUS, horny, hard, *(cornū*, a horn).

COSTA, the anterior or costal margin, *(costa*, a rib). See p. 11.

COSTAL, at or pertaining to the costa.

COXA, the hip, the first joint (see JOINT) of the leg from the body, projected downward. See p. 10 and Pl. I.

CRENATED, having the edge regularly notched whether leaving rounded or angular projections, *(crena*, a notch).

CRENULATED, diminutive of crenated, *(crenula*, a little notch).

CREPUSCULAR, affecting the twilight, *(crĕpuscŭlum*, little night, dim, twilight).

CRETACEOUS, chalky, *(creta*, chalk).

CUPREOUS, coppery, *(cuprum*, copper).

DENTATE, toothed ; used to express the outline of a wing or marking when furnished with projections.

DENTICULATE, small-toothed, *(denticŭlatus*, furnished with small teeth or prongs).

DIAPHANOUS, transparent, pellucid, (διαφαίνειν, to let *(a thing)* be seen through).

DIGONEUTIC, having two broods in the year, (δίς twice ; γόνος, a begetting).

DIMORPHISM, presenting two different forms or appearances, (δίς, twice; μορφή, shape, form, appearance) ; thus when the sexes differ it is sexual dimorphism; and when the spring and autumn broods differ it is seasonal dimorphism.

DISC, a somewhat indefinite expression for a portion of the surface of the wing. See p. 12.

DISCAL, at or pertaining to the disc.

DISCAL SPACES, the spaces between the nervules on the disc.

DISCO-CELLULAR NERVULES, the nervules closing the discoidal cell of the wing. See p. 11 and Pl. I.

DISCOIDAL CELL, the part of the wing enclosed between the subcostal and median nervures and disco-cellular nervules. See p. 11.

DISCOIDAL INTERSPACES, the spaces above the discoidal nervules. See p. 12.

DISCOIDAL NERVULES, the nervules extending from the disco-cellulars to the outer margin. See p. 11 and Pl. I.

DISCOIDAL STREAK, a streak within the discoidal cell.

DIURNAL, pertaining to the day time, as opposed to nocturnal, *(dies*, a day).

DIVARICATED, spread asunder, *(divaricāre*, to stretch apart).

DORSAL, pertaining to the back ; in butterflies, the upper surface of the thorax and abdomen, *(dorsum*, the back).

DUPLEX, two-fold ; double, divided.

EMARGINATE, having the margin interrupted by a notch or segment apparently cut out. See inner margin of hindwing of *Epinephile davendra*, Pl. XV, *f.* 39. *(ē*, from or out of ; *margo*, a margin).

EMITTED, sent out, *(ēmitto*, I send forth).

ENTIRE, used with reference to the wings, to signify that the outline is even and regular.

ERECTILE, capable of being erected or raised.

EXARTICULATE, having no joints.

EXCISED, cut out, *(ex*, out ; *cædo*, I cut).

EXSERTED, protruded, *(exsĕro*, I put forth, or thrust out).

EXTERIOR MARGIN, the margin of the wing furthest from the body. See p. 11 and Pl. I.

FALCATE, hooked or bent like a sickle. See Pl. XII, *f.* 29; forewing of *Melanitis zitenius*, (*falx*, a sickle).

FAMILY, an aggregate of allied genera.

FASCIA, a band.

FASCIATED, banded.

FEMORA, plural of femur.

FEMUR, the thigh; the apparent second joint (see JOINT) of the leg of a butterfly, directed upwards. See p. 10 and Pl. I.

FERRUGINOUS, dusky red, like iron rust, (*ferrūgo*, iron rust).

FILAMENT, a thin thread-like appendage, (*fīlum*, a thread).

FILAMENTOUS, thread-like.

FILIFORM, thread-shaped, long, slender and of equal thickness throughout.

FIMBRIATE, fringed, (*fimbriātus*, separated into shreds or filaments).

FLEXUOUS, bending, winding, or tortuous, (*flexus*, a bending).

FOLLICULATE, provided with glands, foldings or cavities, (*follĭcŭlus*, a small bag or sac).

FULIGINOUS, sooty, (*fūlīgo*, soot or lamp-black).

FULGID, glittering, shining.

FULVOUS, tawny, reddish yellow, the colour of a lion, (*fulvus*, tawny).

FURCATE, forked, (*furca*, a fork).

FUSCESCENT, inclining to swarthy.

FUSCOUS, swarthy, dusky.

FUSIFORM, spindle-shaped; thick in the middle and fining down at each end, (*fūsus*, a spindle).

GEMINATED, double; united; used for expressing a pair of coalescing spots or ocelli. See Pl. XVII, *f.* 64, *Ypthima hyagriva*, underside, the ocelli of the hindwing are geminated; that on the forewing is bipupilled.

GENUS, an aggregate of allied species.

GLABROUS, smooth, (*glăber*, without hair).

GLAUCOUS, silvery, bluish grey or pale bluish green, but always with a sheen, (γλαυκος, gleaming, bright, glancing).

GLOBOSE, spherical or nearly so, (*glŏbōsus*, rounded).

GRANULATED, with a rough surface; consisting of or resembling grains, (*grānum*, a small particle).

HATCHED, closely marked with numerous thin transverse lines.

HAUSTELLATE, suctorial, living by suction, furnished with a haustellum or proboscis, (*haurio*, I draw up).

HAUSTELLUM, the proboscis. See p. 9 and Pl. I, (*haurio*, I draw up).

HETEROCERA, moths. See p. 7.

HINDER MARGIN, the outer margin. See p. 11.

HIRSUTE, coarsely hairy, (*hirsūtus*, rough, shaggy, bristly).

HYALINE, glassy, clear like glass, (ὑαλος glass).

IMAGO, a butterfly, the perfect or last stage of the insect.

IMBRICATE, overlapping, (*imbrex*, a hollow tile) used in connection with the wing-scales.

INCISED, cut into, clipped, (*incīdo*, I cut into).

INCRASSATE, thickened, becoming thicker, (*incrassāre*, to thicken).

INNER MARGIN. See p. 11 and Pl. I.

INOSCULATE, to join in mouth to mouth, (*osculor*, to kiss).

INTERRUPTED, separated or abruptly broken through.

INTERSPACE, the space between any two adjacent nervures or nervules in the wings.

INTERNAL AREA, the space between the submedian nervure and inner margin of forewing. See p. 12.

INTERNAL NERVURE, a small nervure at base of forewing, wanting in many butterflies. See p. 12.

INTERNO-MEDIAN AREA, the space between the median and submedian nervures. See p. 12.

IRIDES, plural of iris.

IRIDESCENT, reflecting rainbow colours, (*ĭris*, a rainbow).

IRIS, the ring in an ocellus or eye-like spot on the wings, usually bright-coloured, (*Iris*, a rainbow).

IRRORATED, specked, sprinkled with minute dots or marks, (*irrōrāre*, to bedew).

JOINT, used in describing the leg or any jointed appendage to express the parts joined together, such as the "femur," "tibia," &c.

LABIAL, at or pertaining to the under lip, (*labium*, a lip).

LABIAL PALPI. See p. 9 and Pl. I.

LABIUM, the under lip. See p. 9.

LABRAL, at or pertaining to the upper lip, (*labrum*, a lip).

LABRUM, the upper lip. See p. 9.

LACINIA, one of the divisions which form a fringe, (*lăcĭnĭa*, a lappet or flap).

LACINIATE, fringed.

LAMINÆ, thin sheets or leaves.

LAMINATED, composed of a series of thin sheets one on another.

LANCEOLATE, gradually tapering towards one extremity, (*lancĕŏla*, a little lance).

LATERAL, on or along the sides.

LARVA, a caterpillar in Lepidoptera; the second stage of development in an insect.

LEPIDOPTERA, the order to which both butterflies and moths belong; literally "scale-wings." See p. 7.

LIMACIFORM, slug-shaped, (*līmax*, a slug).

LOBE, a rounded protuberance in form or outline.

LOBULAR, consisting of or furnished with lobes.

LOBULATE, lobe-shaped.

LONGITUDINAL, lengthwise, from head to tail of body, or from base to outer margin of wing.

LUNULAR, composed of lunules.

LUNULE, a crescent-shaped spot, (*lūna*, the moon).

LUTEOUS, yellowish, or saffron-yellow, (*lūteus*, dyed with the herb *lūtum*).

MACULA, spot, stain, blot, blotch.

MACULAR, consisting of spots more or less coalescing. See p. 12.

MACULATED, spotted.

MANDIBULÆ, the upper jaws, rudimentary and inconspicuous in butterflies.

MARGARITACEOUS, pearly, (*margărīta*, a pearl).

MARGINAL, when applied to markings on the wings; at the *outer* edge.

MAXILLÆ, the under jaws; in butterflies developed into a long tube.

MAXILLARY, pertaining to the under jaws.

MAXILLARY PALPI, the palpi of the lower jaws.

MEDIAN NERVURE, the central rib of the wing-frame, below the discoidal cell. See p. 11 and Pl. I.

MEDIAN INTERSPACES, the spaces between the branches of the median nervure.

MEMBRANACEOUS, resembling a membrane; a thin expanded tissue, (*membrāna*, the skin that covers the vital parts of the body).

MEMBRANOUS. See "Membranaceous."

MESOTHORAX, middle section of the thorax. See p. 10.

METAMORPHŌSIS, change of form, or outward appearance, transformation, (μετά, implying change of condition; μορφή, shape).

METATHORAX, hindermost section of the thorax. See p. 10.

MIMETIC, imitative, apt to imitate, (μιμεῖσθαι, to imitate). See p. 2.

MONOGONEUTIC, having a single brood each year, (μονος, alone; γόνος, a begetting).

NERVULE, a branch rib or veinlet of the frame-work of the wings. See p. 11.

NERVURE, a main rib or vein of the frame-work of the wings. See p. 11.

NEURATION, the arrangement of the nervures and nervules of the wings.

OBCONIC, inversely conical, the narrow end downwards.

OBLIQUE, with reference to bands of colour on the wing, not perpendicular to the costa or axis of length.

OBOVATE, inversely ovate, the narrow end downwards.

OBSOLETE, almost disappeared, (*obsŏlētŭs*, worn out, old, thrown off).

OBTUSE, blunt at the extremity.

OCELLUS, an eye-like spot on the wing consisting of one or more rings of different colours with a central spot.

OCHREOUS, or OCHRACEOUS, a pale dull yellow, (ὠχρός, pale yellow).

OLIVACEOUS, olive coloured, or dark brownish green, (*ŏlīva*, an olive).

ORAL, at or pertaining to the mouth, (*ōs, ōris*, the mouth).

OSMETERIA, scent-glands, (ὀσμή, a smell, a scent.)

OVATE, shaped like an egg, with one end broader than the other, (*ōvum*. an egg).

OVIPAROUS, egg bearing, (*ōvum*, an egg; *părĭo*, I bring forth).

PAGINA, the surface of a wing; upper or under, (*pāgĭna*, a page).

PALPI, appendages of the maxillæ and labium; those of the latter or "labial palpi" are largely developed in butterflies. See p. 9 and Pl. I.

PAPILLÆ, applied to the minute leaf-like projections at the end of the proboscis, (*păpilla*, a nipple).

PARENCHYMA, soft cellular tissue, (παρα, beside; ἐγκεῖν, to pour in).

PARONYCHIA, appendages to the claw found in certain genera of butterflies; more or less triangular in form, membranaceous, hairy, sometimes so broad as almost to conceal the claw, sometimes narrow and almost linear, (παρα, beside; ὀνυξ, the nail).

PATAGIA, shoulder-plates, attached to the thorax just above the base of the fore-wings, (*pătăgium*, the edging on a Roman lady's tunic). See p. 10.

PATCH, a large marking or extent of any colour.

PECTORAL LEGS, the forelegs of a cater pillar. See p. 8, (*pectus*, the breast).

PEDUNCLE, a stem or stalk, (*pĕdunculus*, diminutive of *pes*, a foot).

PELLUCID, transparent.

PICEOUS, pitchy, pitch-black, (*pĭcĕus*, made of pitch).

PILOSE, hairy, (*pĭlus*, a hair).

PLUMOSE, softly feathery, (*plūma*, a small soft feather; the downy part of a feather).

POLYGONEUTIC, having several broods in the course of a year, (πολύς, many; γόνος, a begetting).

PORRECT, projected forwards, as opposed to erect, (*porrectus*, stretched out, extended).

POSTERIOR ANGLE, the hinder angle of the forewing. See p. 11 and Pl. I.

POSTERIOR MARGIN, the outer margin of the wing. or that furthest from the body. See p. 11.

PRÆDISCOIDAL CELL, a small space at base of hindwing, closed by a slender nervule connecting the costal and subcostal nervures. See p. 11.

PRECOSTAL NERVURE, a short nervure at the base of the hindwing. See p. 11.

PRIMARY, or PRIMARIES, a term used by some authors to express the forewing.

PROBOSCIS, a trunk or snout. See Pl. I.

PROCESS, a protuberance, or projecting part.

PRODUCED, lengthened out, elongated.

PROLEGS, the fleshy hindlegs of caterpillars. See p. 8.

PROTHORACIC, at or pertaining to the prothorax.

PROTHORAX, the front segment of the thorax, nearest the head. See p. 10.

PTERYGODES. See "Tegulæ," and p. 10, (πτέρυξ, a wing; εἶδος, shape).

PUBESCENT, downy, finely hairy.

PULVILLUS, an appendage to the base of the claws, sometimes elongate and jointed sometimes minute, and often wanting altogether, (*pulvillus*, a little cushion).

PUPA, a chrysalis.

PUPIL, a spot in the central part of an ocellus.

PYRIFORM, pear-shaped, (*pyrum* or *pĭrum*, a pear).

QUADRATE, squared, shaped like a square, (*quadrum*, a square).

RADIAL, a term applied to the discoidal nervules. See p. 11 and Pl. I.

RECUMBENT, reclining, settled down.

RECURVED, bent backwards, turned back, or curved in two directions like an S.

RETRACTILE, capable of being drawn back, (*re*, back ; *trăhĕre*, to draw).

RHOPALOCERA, butterflies or "club-horns." See p. 7.

SAC, a small bag or pouch.

SAGITTATE, arrow-shaped, (*săgitta*, an arrow).

SCALLOPED, having the margin cut out with concave segments of circles.

SCENT POUCH, an organ attached to the wing or other part of the body of the males of some genera, secreting odours.

SCUTELLUM, a small triangular portion of the mesothorax, (*scūtum*, a shield).

SEASONAL DIMORPHISM, having the autumn or summer broods differing from the spring brood. See p. 2.

SECONDARY or SECONDARIES, a term used by some authors to express the hindwing.

SEGMENT, a division of the body, (*sĕco*, I cut).

SEMIHYALINE, somewhat glassy. See "Hyaline."

SERICEOUS, silky, (*sēricus*, silken).

SERIES, a line or row ; generally of spots on the wings.

SERPENTINE, obscure green, or rich oil-green of various shades ; like the mineral serpentine.

SERRATED, notched, (*serra*, a saw).

SETÆ, bristles, (*sēta*, a bristle).

SETOSE, bristly.

SHOT, glossed with a surface colour visible only in certain lights.

SINUATE, wavy, (*sĭnus*, a curve).

SINUOUS, wavy. See "Sinuate."

SPACE, the area between two nervures or nervules or a nervure or nervule and the margin.

SPATULAR, shaped like a spattle, a roundish end with a narrow linear base, (*spatula*, a spattle).

SPATULATE. See "Spatular."

SPECIES, a group of individuals presumably descended from the same parental stock.

SPINOUS, furnished with spines.

SPINNERET, a small perforated organ through which a caterpillar emits its silk.

SPIRACLE, an aperture, a round or narrow opening on the surface of the body used for breathing, (*spīrācŭlum*, an air-hole).

SQUAMOSE, full of scales, (*squāma*, a scale).

SQUAMOUS, scaly.

STEMMATIC, a term applied to the simple eyes of an insect, which are placed on the crown of the head, and are scarcely visible, not to be confounded with the compound eyes, which are large and protruding, and which are referred to when the eyes are mentioned, unless the stemmatic eyes are specially indicated, (*stemma*, a wreath ; anything to crown with).

STREAK, a narrow stripe.

STRIA. See "Striga."

STRIATED, marked with striæ, or fine very short lines.

STRIDULATION, with insects the noise produced in some species by friction of the external organs, (*strīdeo*, I creak, buzz, rattle).

STRIGA, a streak, (*strĭngere*, to scrape). Generally a very short streak.

SUB, as a prefix in composition used to denote near to or approaching to, or somewhat, (implying diminution), but *not* under.

SUBANAL, near the anal region ; usually applied to that of the hindwing.

SUBAPICAL, near the apical region. See "Apical."

SUBCORIACEOUS, somewhat leathery. See "Coriaceous."

SUBCOSTAL AREA, the space between the costal and subcostal nervures. See p. 12.

SUBCOSTAL NERVURE, the rib of the framework of the wing bounding the discoidal cell on the upper side. See p. 11.

SUBCOSTAL NERVULES, the branches of the subcostal nervure. See p. 11.

SUBDIAPHANOUS, somewhat transparent. See "Diaphanous."

SUFFUSED, clouded or obscured, tinged, (*suffundĕre*, to pour through ; to overspread).

SUBFOLLICULATE, somewhat glandular. See "Folliculate."

SUBMARGINAL, near to the margin, usually the outer margin.

SUBMEDIAN NERVURE. See p. 12 and Pl. I.

SUBULATE, awl-shaped, narrow, narrowing to a point from a broadish base, (*sūbŭla*, an awl).

SUTURAL AREA, the posterior or inner-marginal area where the wings overlap, (*sūtūra*, a seam).

SYNONYM, a name that has fallen into disuse from any cause.

TARSUS, the fourth apparent joint (see JOINT) of the leg in the perfect insect. See p. 10 and Pl. I.

TAIL, a long projection from the outer margin of the hindwing; also applied to the anal extremity of the body.

TEGULÆ, shoulder-plates on the thorax at the bases of the forewings, (*tĕgŭla*, a tile). See "Patagia" and p. 10.

TENTACULA, a thread-like or filiform appendage.

TESTACEOUS, shell-like, (*testa*, a shell).

TETRAPOD, four-footed, applied to butterflies having the forelegs imperfect, (τέσσαρες, four; πους, a foot).

THORAX, the middle section of the body to which all the limbs are attached. See p. 10.

TIBIA, the apparent third joint (see JOINT) of the leg in the perfect insect. See p. 10 and Pl. I.

TIPPETS. See "Tegulæ" and "Patagia"; also p. 10.

TRACHEÆ, the respiratory organs or system of tubes for the admission of air to the viscera.

TRANSVERSE, as applied to markings on the wing means in the direction of the breadth of the wing. See p. 12.

TRIARTICULATE, three-jointed, (*trēs*, three; *artĭcŭlus*, a little joint).

TRIFID, three-cleft, split into three points, (*trēs*, three; *findĕre*, to cleave).

TRIFURCATE, three-forked, branching into three directions, (*trēs*, three; *furca*, a fork).

TROCHANTER, the joint between the coxa and the femur. See p. 10.

TRUNCATE, cut off, or appearing as if cut off at the top, (*truncus*, maimed, cut short).

TRUNK. See "Proboscis."

TUBERCLE, a small warty projection or knob, (*tūber*, a hump or knob).

TUBERCULATE, furnished with tubercles.

UNGUES, claws, (*unguis*, a nail or claw).

UNDERSIDE, the surface exposed when the butterfly's wings are closed.

UNDULATE, wavy, (*unda*, a wave).

UNICOLOROUS, of one uniform colour.

UPPERSIDE, the surfaces in contact when the butterfly's wings are closed.

VEINS, the main ribs of the frame-work of the wings. See "Nervures."

VEINLETS. See "Nervules."

VILLOSE, very shaggy with soft hairs, covered with fine hairs, (*villus*, shaggy hair).

VILLOUS, hairy.

VIOLACEOUS, inclining to violet; pale violet.

VITTA, used to signify a short streak, (*vitta*, a ribbon, fillet).

VITTIFORM, shaped like a Vitta.

PREFACE.

INDIA, the land of sunshine, is a land of Butterflies ; for, though in the arid plains of the north insect-life languishes during the dry months, it revives marvellously when the periodic rains set in ; and in the moister parts of the country, especially to the east and south, and in the warm valleys of the hilly regions, the amazing numbers of Butterflies and other beautiful insects cannot but strike the most unobservant. In one of his charming essays on tropical nature, Professor A. R. Wallace has remarked that, although in tropical countries individual flowers attain to a size and brilliancy of colouring unknown in temperate climates, it is merely in the individual flower, and not in general effect, that the products of tropical climes excel. There is nothing in tropical landscapes, for instance, that can compare with the heather and gorse of our own country, or with the gorgeous carpeting of the alpine valleys, ever moist with the melting snows. But in insect-life it is otherwise ; both in size and beauty of individuals, and in prolific luxuriance of numbers, the tropics easily bear off the palm ; the largest and most beautiful of European Butterflies sink into insignificance beside the *Ornithoptera*, *Morpho*, and *Thaumantis* of the tropics ; while, perhaps, few sights in nature are more strangely beautiful to the traveller in these Eastern valleys than the patches of damp sand which may be found in torrent-beds in the forests literally carpeted with Butterflies of every hue, closely packed together, busily imbibing the moisture from the sand, and, again, as startled by the approach of an intruder, they rise expanding into a cloud of gorgeous colours of every hue. The difficulty in securing rare species is, in such localities, literally the difficulty of singling them out of a crowd.

The large size, the quaint shapes, and the dazzling brilliancy of the colouring of many of the Indian Butterflies have made them favourite objects of observation and often of collection ; but, though collections are frequently made or purchased, comparatively little has been done here towards investigating the life-history of these beautiful creatures, or towards improving the opportunities offered by such a study of gaining light on the scientific questions and problems of zoology.

The study of Entomology is not merely an interesting recreation for those who can find leisure and opportunity to pursue it, but, even when restricted to Butterflies only, it offers a field for scientific enquiry of the highest importance, in connection especially with the origin of species and other cognate questions. Putting aside the various stages of egg, caterpillar, and chrysalis, through which all Butterflies pass, and in which opportunities for study are ample, the perfect insect, as it emerges from the chrysalis, exhibits variations at least as numerous and important as those of other classes of living organisms, while the short duration of its life, and the quickly succeeding generations, offer facilities for tracing the course of such variations, and thus deducing the causes which govern them, perhaps unrivalled in the whole field of nature. These variations, though possibly traceable ultimately to the same causes, may be grouped under several heads. It must not be forgotten that variety is in a certain sense universal, for no two individuals are really absolutely alike ; but numerous individuals are to be found so closely resembling each other that, to the naked eye, no difference is traceable; or, if traceable, the differences are so slight as to leave no room for doubt, even if other evidence were wanting, that the individuals are derived from the same parental stock ; or, in other words, belong to the same species. If this close similarity of individuals were constant in each species, there would be no

difficulty in discriminating and identifying insects, though, at the same time, the scientific value of the study would be largely reduced; but it is not so. First we find that in some species the sexes are differentiated—the females differing from the males either in colour or style of markings, and even in form and outline of the wings, these differences being constant in each sex. Again, we find that in different climates Butterflies, apparently the same in general character, present constant differences in colour or style of marking of more or less importance, but frequently sufficient to justify the description of each form under a separate name. Again, in different localities, even where the differences of climate are inappreciable, such as notably the various islands of an archipelago, and in a lesser degree disconnected valleys of a mountain range, the Butterflies of each locality often present constant and well marked differences, particularly in the size and extent of markings, thus forming what have been termed "geographical" varieties in contradistinction to "climatic" varieties; and yet, again, we have the most interesting and important variation of all occurring among Butterflies which have two or more broods in the year; and in which the summer and autumn broods differ from the spring brood more or less, sometimes so widely in colour and markings that, until the question was conclusively set at rest by breeding Butterflies of the one type from the eggs of Butterflies of the other, the two forms were described and universally accepted as representing two distinct species.

Thus we have "sexual," "climatic," "geographic," and "seasonal" variations, each of which can be referred more or less confidently to known external causes; but, in addition to these, the study of the subject is complicated by individual variations, which appear to be quite irrespective of external conditions; such variations are exhibited in different species in different degrees, or possibly the tendency to vary may pass through more or less active or dormant stages at different epochs of the history of each group. At the present time some species, notably among the *Junonias*, are wonderfully constant to the type; others, again, differ so universally among themselves that scarcely any two specimens, even from the same locality, are alike. Of such variations the under-surfaces of the wings in *Melanitis leda* and *M. ismene*, and in the great "oak-leaf" Butterflies of the genus *Kallima*, are noteworthy instances; also the numbers and size of the ocelli in many genera of the *Satyrinæ*: and, again, instead of a single typical form, with minor differences in each individual, we sometimes find, as in the case of *Papilio polytes* or *P. memnon*, that there are several distinct types, described by the earlier authors as distinct species, but which in reality spring promiscuously from the same stock—a single batch of the eggs laid by a single female having been found to produce two or more of the different forms. And, lastly, we find that specimens aberrant from the type occur singly and casually here and there from time to time, and coexisting in the same localities with specimens of the normal form. It may easily be conceived that among insects with such manifold tendencies to variation and such brief periods of existence, the clue to the laws which govern such developments may most readily be found.

The phenomenon of "mimicry," too, is deserving of the closest scientific observation. One of the earliest puzzles met with by the observer of Butterflies lies in finding males and females in company, apparently belonging not only to different species, but different genera, and even families; but closer examination reveals that the female in reality belongs to the same species as the male, although its colouration and markings are excellent imitations of a totally different Butterfly, generally of a much commoner Butterfly, and almost always of a Butterfly less subject than its own species to destruction by birds and reptiles. The subject is too extensive to enter on here, but it is one that should never be lost sight of in investigating the life-history of insects.

The field for observation offered by the British Indian Empire is as varied as it is vast. We have every climate, from the eternal snows to the tropics—and all the most interesting

phenomena of Entomology may here be studied in life—yet little has been done beyond attaching a name to each different form or species; and even in this preliminary ground-work the greater portion of the labour has been carried on, not by Englishmen, but by foreigners. The larger number of our Indian species have been named by French, German or Russian naturalists, while not one per cent. have been named by English naturalists in this country. The few among our countrymen out here who have taken up the study have worked under difficulties sufficient to dishearten the most ardent student; and the usual result has been that their laboriously collected observations and notes have either been lost altogether, or rendered comparatively useless owing to difficulties in identification of the species observed, or to omission of some detail, the importance of which could only be known to skilled zoologists.

The reason for this state of affairs is obvious. No attempt has hitherto been made to bring the study of the science within the reach of the public in this country. The published information regarding Indian Butterflies is scattered over numerous works, many of which are out of print, and are either not to be bought at all, or else only at prices beyond the means of private individuals. The older books deal with Butterflies from all parts of the world, and the more recent papers regarding the Butterflies of particular localities, such as the "Butterflies of Malacca" by Butler, the "Butterflies of Tenasserim," of the "Andamans and Nicobars," of "Bengal," of the "North-West Himalayas," &c., by Moore, consist of bare and incomplete lists of names, with descriptions of a few new species; and, while amply fulfilling the special object with which they were published, are of no use whatever to the general public, except to the few who, having access to good museums and libraries, have at hand the means of supplementing for themselves the information given.

It has been well nigh impossible under such circumstances for collectors of Butterflies in this country to name their own specimens, and our knowledge of Indian Butterflies has been limited to the contents of such of the more important collections as have been from time to time sent to the Museums of Europe for study and description; but the contents of the smaller collections have, for the most part, been left unrecorded. It is probable that there are, comparatively, few species in this country still unnamed; but that something in this direction still remains to be done is proved by the fact that, since it became known about a year and a half ago that this book was under preparation, nearly fifty new species have been discovered by naturalists in this country—a number far exceeding that of all the species hitherto named by working naturalists in India.

But in the matter of scientific observation of habits and life-history we repeat that very little has been done. To get this we must be mainly independent of foreign help—we must depend on our own exertions. No one collector, however zealous, and no single observer, however accurate and persevering, can exhaust the subject even in a single locality. It is by the combined efforts of the many that progress will be secured. The study in this country has hitherto, as we have shown, lacked the stimulus and interest that a knowledge of the nomenclature, and a record of what had previously been discovered, would have supplied; and it is to supply this want, and to secure the co-operation of all those who take an interest in the matter, that a descriptive handbook is required. It has been no small encouragement to us to find that, in the comparatively short time that has elapsed since this work was commenced, we have received hearty sympathy and help from naturalists all over the country, who have not only redoubled their exertions in collecting and observing, but have generously assisted us with specimens, notes, and valuable advice, while several gentlemen, not previously interested in the subject, have undertaken to collect in various localities. Professor J. Wood-Mason, Deputy Superintendent of the Indian Museum, Calcutta, has also in view of this publication thoroughly re-arranged and investigated the

national collection, and published numerous papers and local lists of the greatest value, besides assisting us most kindly in discriminating the species. Owing to his exertions the national collection has been more than doubled since this book was begun.

From Burma we have received specimens of almost every species hitherto recorded; also of numerous species new to the country, and of several new to science, through the kindness of Captains C. T. Bingham and C. H. E. Adamson, and Messrs. Eugene Oates and T. C. Hill. To Captain Bingham's exertions the discovery of *Zophoëssa dura*, *Neope bhima*, *Penthima binghami*, *Papilio claræ*, the male of *Zeuxidia masoni*, the female of *Thaumantis louisa*, and many other new and interesting forms, is due. From the Andamans and Nicobars, Colonel T. Cadell, V.C., and Mr. A. R. de Roepstorff have kindly sent numerous specimens, including many species new to science. We have also been aided from Eastern Manipur by Mr. A. O. Hume; from Assam by Mr. C. Donovan and Surgeon-Major G. R. Johnson; from Sikkim by Messrs. Otto Möller and W. Davison; from Western Bengal by Messrs. W. E. Brooks and C. J Marshall; from Naini Tal by Mr. E. T. Atkinson; from the North-West Himalayas by Lieutenant-Colonel A. M. Lang, R.E.; Mrs. Deane, General Macintyre, Mr. Robert Ellis in Pangi; Mr. A. Graham Young in Kulu; Major C. H. T. Marshall in Chumba; the Rev. A. W. Heyde in Ladak; and Major J. Biddulph in Gilgit; from Agra by Mr. C. A. R. Crommelin; from Sind by Major C. Swinhoe; from Bombay by Mr. E. H. Aitken; from Poona and Ratnagiri by Mr. G. Vidal; from the Wynaad by Mr. Rhodes Morgan; from Travancore by Messrs. Ferguson and Bourdillon. To Mr. Ferguson, especially, we owe the discovery of *Mycalesis oculus*, and of that remarkable insect *Parantirrhœa marshalli*; and from Ceylon we have been assisted by the Hon'ble F. Mackwood;—to all these gentlemen our thanks are due for the welcome aid afforded us in this laborious task, but most of all we are indebted to Captain C. T. Bingham, who not only is a most skilful collector, but most generously has placed at our disposal the whole results of his labours.

This book does not attempt a life-history of each or any of the insects. The time has not arrived for such a work; the details required for a life-history cannot be gathered until a knowledge of the nomenclature is far more widely diffused. It is simply designed as a handbook of reference, as complete as possible in itself, for the convenience of naturalists in the field who have no access to libraries. Where necessary full extracts from other works, not usually available, are given; and where possible and advisable, the description of species are given in the words of the original describers, supplemented by any further details needed to complete them. For the genera the admirable descriptions by Westwood (in the Genera of Diurnal Lepidoptera) have been followed as closely as possible.

The book will comprise detailed descriptions of every genus and species known to occur within the limits of India, British Burma and Ceylon; and short descriptions will be added in smaller type of species from neighbouring countries on the border, such as Malacca, Siam, Yunan, Thibet, South Turkestan, Afghanistan and Beluchistan, which, though not yet recorded from within Indian limits, may very probably subsequently be found to occur within our border.

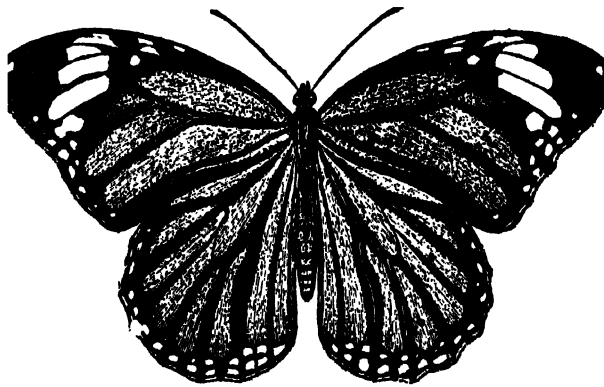
The absence of coloured illustrations is a great drawback, especially to beginners; but coloured illustrations are expensive; and, as the great object in issuing the book at all is to give it as wide a circulation as possible, it has been thought expedient to confine the illustrations for the most part to uncoloured engravings, and to restrict the number to what will be sufficient to indicate the more typical forms and to supplement the written descriptions. At least one illustration of each genus, and generally of each sub-genus, will be given, as mere description fails to convey to any, except to the practised Entomologist, a sufficiently clear conception of the forms, especially in outline; and a glance at the plates will usually be

sufficient to guide the beginner as to the place where the description of any particular species may be found.

After the book is published, and if the circulation it attains appears to warrant it, coloured illustrations will be published in continuation.

No pains have been spared to render this hand-book as complete as possible : and, in judging of the result, we trust that the public will remember the difficulties under which works of this nature are necessarily undertaken in this country : and that the compilation has been carried on, not in the quiet and leisure of a studio, but in the intervals of a busy official life.

INTRODUCTION.



DANAIS *(Salatura)* GENUTIA, Cramer.

Class.—INSECTA.
Order.—LEPIDOPTERA.
Sub-order.—RHOPALOCERA.

THE insects of this order are distinguished from other insects by their having the wings more or less densely covered with minute scales of various colours, whence the name LEPIDOPTERA, (λεπις, a scale ; πτερόν, a wing).

The order, which comprises an enormous number of different species, is divided into two sub-orders—HETEROCERA or Moths, and RHOPALOCERA, or Butterflies : the insects of the latter sub-order are alone treated of in this book. The distinction between the sub-orders is primarily based on the structure of the antennæ as expressed in the terms Rhopalocera (ῥόπαλον, a club ; κέρας, a horn), and Heterocera (ἕτερος, different ; κέρας, a horn), the antennæ of Butterflies being more or less uniform in structure and clubbed at the tip, while those of Moths exhibit great variations of structure among different genera and species, and even in the different sexes of the same species.

But there are several other characteristics by which Butterflies can generally be distinguished from Moths. Butterflies are never nocturnal in their habits. Some few species fly at twilight, but with very few exceptions they fly only in the day-time, and, as a rule, are active on the wing only during sunshine ; the eyes of Butterflies too are larger as a rule and more prominent than those of Moths : again the antennæ of Butterflies, which are straight, filamentous and more or less clubbed at the tip, are always held erect or extended in front of the head, and are never either twisted or folded away by the insect. On the other hand the antennæ of Moths are highly flexible, and during repose are almost invariably folded backwards along the body and concealed under the wings. Again, the division between the thorax and the abdomen is strongly defined in Butterflies, while in most Moths the division is inconspicuous ; and, lastly, Butterflies may be distinguished by the position of the wings in repose being, among them, more or less erect over the back and never folded close along the body ; or, in other words, Butterflies when in repose usually exhibit the under-surface of the wings ; Moths in repose have only the upper surface visible.

None of these distinctive features taken singly will always suffice to distinguish a Butterfly from a Moth ; perhaps the surest test of all is the erect posture or otherwise of the antennæ. If

the antennæ are folded under the wings in repose it may be at once safely concluded that the insect is not a Butterfly, even though it may fly by day, or hold its wings partially erect. In some genera of Butterflies the club at the end of the antenna is almost obsolete, but still the antennæ are straight, erect and never folded back or concealed. On the other hand, many of the Moths are day-fliers, many have slender bodies, and in many the shape of the wings and general appearance present great similarities to the appearance of Butterflies, but in such cases the structure of the antennæ will serve to determine the affinities.*

Butterflies, as well as Moths, are oviparous and pass through four stages of development—the egg, the caterpillar, the chrysalis and the imago, or perfect insect. The usual extreme period of existence extends to one year, during which all four stages are accomplished; but in numerous instances, especially in warm climates, where the winter is short and the summer long, one or more intermediate broods occur, in fact in some cases there is a continuous succession of broods throughout the year, while occasionally, under unfavourable circumstances, the egg or the chrysalis may lie dormant through more than one season.

The EGGS of Butterflies are deposited either singly on in groups, on the leaves or bark of trees as a rule; sometimes on the calyx of a flower, as in some of the *Lycænidæ*, but always on or near to the food-plant of the caterpillar. In form and pattern the eggs are strangely diversified, far more so than among birds; but for each species the eggs are uniform in shape, colour, and structure, so that the species to which any particular egg belongs can easily be identified: at the same time the eggs of closely allied species often differ widely, so that among Butterflies the eggs afford little or no indication of the affinities of the perfect insect. The laying season varies according to the habits of the species—some kinds passing the winter or "hybernating" in the egg state, some as caterpillars, some as chrysalises, and some, again, in the perfect state.

The CATERPILLARS of Butterflies are usually elongate, and more or less cylindrical in shape, (see Plate II). They consist of thirteen segments, the first of which forms the head and is furnished with twelve microscopic eyes, situated near the mouth, six on each side, and generally arranged in a circle. These eyes are highly convex, only enabling the caterpillar to see objects when close against its mouth; the head varies in shape very much, and is generally furnished with two short, sometimes retractile, antennæ, and two feelers, which usually emerge one on each side from the apex of the underlip, and appear to correspond with the labial palpi of the perfect insect; and occasionally with other protuberances of various kinds. The mouth is furnished with a pair of strong, horny, toothed jaws or *mandibulæ*, working sideways, and a lower pair of jaws of a softer consistency termed *maxillæ*; these latter are furnished with a pair of small jointed organs corresponding to the palpi. Near the summit of the labium or under lip, is a small orifice through which issues the silken thread which caterpillars produce. The legs are sixteen in number, arranged in pairs on the second, third, fourth, seventh, eighth, ninth, tenth, and thirteenth segments; the front three pairs, or the true legs, which correspond to the legs in the perfect insect, are horny, jointed and terminate in a strong claw; the last five pairs are very different in structure, being wide, fleshy and broadened at the base, and are termed "prolegs" or "claspers"; the last pair of claspers are termed the "anal" claspers, and the remaining four pairs the "abdominal" claspers. The true legs in front are also sometimes called the "pectoral" legs. Caterpillars are also provided with eighteen "spiracles" or breathing holes arranged in rows along their sides—one row on each side of nine spiracles, one to each segment, except the first, third, fourth, and thirteenth, on which they are wanting. These spiracles are the mouths of air-tubes which constitute the respiratory system. Besides these regular structural features, they are often furnished with remarkable appendages, (see Plate II). The caterpillars of *Athyma* and some other genera are provided with erect processes, more or less spiny towards the tip. Some caterpillars, such as those of *Adolias*, have lengthened procumbent appendages on each side, fringed with long hairs;

* In some aberrant genera of American Moths the antennæ are clubbed. But no Indian Moths, so far as we know, exhibit this feature.

those of *Elymnias* and *Melanitis* have two lengthened appendages on the hinder segment and two short ones on the head; those of *Charaxes* have four projections on the head and two short ones on the hinder segment; in the *Hesperidæ* the head is usually large and the neck narrow, while in the *Pierinæ* the head is small. The outline, though typically cylindrical, varies from fusiform among the slug-like caterpillars of the *Lycænidæ*, to an almost uniform lengthened cylinder among the *Pierinæ*. Caterpillars are often nocturnal feeders, and escape observation by lying concealed during the day-time.

The CHRYSALISES too vary much in shape, colour and ornamentation, (see Plate II); the colour usually being adapted to that of the surface to which the chrysalis is attached. The only peculiarities on which it is necessary to touch in this short introductory notice, are in the matter of positions selected for transformation, and the methods of securing the chrysalis from disturbance during the state of torpor. There are five typical methods adopted for this purpose: first, the suspension of the chrysalis by the tail only from the underside of a leaf or twig or other object; this is the usual practice with the *Nymphalidæ*, (see Plate II, *Athyma leucothoë* and *Adolias lubentina*); second, the suspension of the chrysalis in a horizontal position, or with the head inclined upwards, attached by the tail and also by a thread passed round the middle of the body and secured at both ends: this position is adopted by many of the *Lycænidæ*, (see Plate II, *Amblypodia timoleon*); third, the suspension of the chrysalis by the tail vertically, head downwards, but girt in addition by a thread round the middle of the body: this method is of frequent occurrence among the *Pierinæ*, (see Plate II, *Hebomoia glaucippe*); fourth, the attachment of the chrysalis by the tail, but in an erect position with the head upwards, and further secured by threads, either passing round the middle of the body, or attached on either side: this is the usual posture among the *Papilionidæ*, (see Plate II, *Papilio polytes**); fifth, with the chrysalis free, but enclosed either in the rolled-up edge of a leaf, or between two or more small leaves drawn together by silky threads. This method is typical among the *Hesperidæ*, (see Plate II, *Ismene œdipodea*). In the genus *Parnassius* (*Papilionidæ*) the chrysalis is enclosed in a loose silky web on a leaf; the chrysalis of the "Grayling" (*Hipparchia semele*) is described by Newman as being placed beneath the surface of the soil, and there are doubtless many other exceptions; but the five postures and methods described above are typical of the five great divisions of Butterflies.

The IMAGO or perfect state is the most highly developed, and a knowledge of the structure of its various organs is essential to the comprehension of the divisions into families and genera. Plate I shows the principal features, and explains the names, which have been used to describe the different parts. A careful study of this plate will render the descriptions of the species intelligible to the reader. The perfect insect has always four wings and six legs, the latter sometimes not all fully developed; the body is in three sections—the head, the thorax, and the abdomen; and the head is furnished with antennæ, eyes, and oral appendages. Butterflies derive their nourishment from liquid substances, and the structure of the mouth is adapted to this end. The under jaws are developed into a long flexible tube called the "proboscis" or "haustellum," which, when not in use, is curled up closely under the face; the under lip (or *labium*) is furnished with two processes, called the "labial palpi" or "palpi" (see Plate I) projected forwards, or upwards, one on each side of the mouth; the upper jaws and upper lip (or *labrum*) are rudimentary and scarcely discernible.

The PALPI consist of three joints, the middle one usually the longest, the basal and terminal joints being often very short. They are covered with scales or hairs, varying much in length and texture. The very long hairs of the palpi are distinctive of the family *Satyrinæ*; they also vary much in size and form, and occasionally, as in *Libythea*, and in some of the *Lycænidæ*, are very largely developed; in some cases the palpi are separated throughout their length; in others they meet at the tip, forming a sort of beak in front of the head.

* The position shown in the figure of the chrysalis of *Papilio polytes* in Plate II, is not typical. The abdominal half of the chrysalis and the stem to which it is attached should be at least vertical, if not leaning slightly over; the upper half of the chrysalis extending outwards nearly horizontally.

The EYES of Butterflies are large, immovable, compound and convex; sometimes smooth, sometimes hairy, and consist of a great number of separate lenses. Butterflies also are said to possess two extremely minute simple or "stemmatic" eyes, placed on the crown of the head and scarcely visible, but the existence of these latter has been disputed.

The ANTENNÆ, which project from the forehead between the eyes, are of moderate length, being from one-half to seven-eighths, usually about two-thirds, the length of the body, and consist of a great number of segments, which increase in diameter more or less gradually towards the tip; the knob thus formed at the tip varies considerably in shape in different families, and affords useful distinctive characters. Typically the antennæ are straight, but in some genera they are hooked at the tip; they are always erect and never concealed during repose.

The THORAX forms the middle part of the body between the head and the abdomen; to it all the wings and legs are united, and it contains the muscles by which all the limbs are actuated. It is shorter than the abdomen, and consists of three segments, so closely united as to appear to form a single piece. The first nearest the head is called the *prothorax*, and bears the fore pair of legs; the middle one, the *mesothorax*, which bears the middle pair of legs and the forewings; and that nearest the abdomen, the *metathorax*, which bears the hindlegs and hindwings.

To the mesothorax, just above the wing joints, are attached a pair of triangular scales, like epaulets, which have been called "*tegulæ*" or "*patagia*" or "*pterygodes*" or "*tippets.*" The surface of the thorax is covered with hairs of greater or less density and length.

The ABDOMEN is united to the thorax by a narrow link. It consists of nine segments, and is of a softer consistency than the thorax: the only appendages to the abdomen which require notice at present are the large anal valves, which are found in the males of some species of *Papilionidæ*.

The LEGS are six in number, but in a large number of species the fore pair of legs is imperfect, unfitted for walking, and held drawn up close to the sides of the thorax, and partially concealed by its hairs, the Butterfly appearing as if it had only four legs. The characters of the legs are of great importance, and on the extent of development of the forelegs the primary divisions of Butterflies into families usually rests. The perfect leg consists of the following parts:—(1), the *coxa*, which is attached to the body, corresponds with the hip, and is directed vertically downwards; (2), the short joint connecting the femur with the coxa, called the *trochanter*, is counted as the second section of the leg; (3), the *femur*, which is jointed to the coxa, corresponds with the thigh, and is directed upwards; (4), the *tibia* or shank, which is jointed to the femur and directed downwards; the joint between the tibia and femur being the most elevated point of the leg in repose; (5), the *tarsus*, which is jointed to and directed in prolongation of the tibia; the tarsus in all perfect legs consisting of five joints. The coxa and femur are often hairy, and in imperfect forelegs the tibia and tarsus are likewise often more or less densely fringed with hairs; the tibia of the foreleg in *Papilionidæ* and *Hesperidæ* has a spur about the middle, which is present in no other family of Butterflies. The tibia of the hindleg has also one pair of movable spines in most of the *Papilionidæ*, and two pairs in many of the *Hesperidæ*. The tarsus in the perfect leg is terminated by two claws, which are sometimes entire or simple, and sometimes bifid; at the base of the claws the tarsus is also furnished in some families with other appendages, called *paronychia* and *pulvilli* (see Glossary of Terms); the development of these appendages when present varies a good deal in the different genera.

The WINGS are larger among Lepidoptera in proportion to the body than in any other order of insects, and among Butterflies form the most conspicuous parts of the whole insect. The usual shape of the forewing is triangular, and that of the hindwing rounded, but the outline, though usually similar in allied species and often affording specific and even generic characters, is subject to great variations. These variations often mark sexual distinctions, but occasionally individuals of the same species and sex differ widely in outline, as in the case of the females of

P. memnon, some of which have a large spatulate tail to the hindwing, while in others no sign of a tail is visible. The wings consist of a fine translucent membrane, permeated by a number of ribs, like the veins of a leaf or the rays of a fish's fin, and the whole covered more or less densely, both above and beneath, with tiny scales in which the colours of the wing lie. These ribs have been styled by various authors as "nervures" and "nervules," or "veins" and "veinlets," or "rays." In this book the former terms are adopted, the *nervures* signifying the main ribs, and the *nervules*, the branches which they throw off. In describing the wing of a Butterfly (see Pl. I), the junction of the wing with the body is called the *base* (A); the margin nearest the head from the base outwards is called the *costal margin*, or *costa*, or the *anterior margin* (A B); at the end of the costal margin, furthest from the body, is the *apex* (B); the margin furthest from the head from the base outwards is called the *inner* or *interior margin* (A C), and in the hindwing the *abdominal margin* (A D); at the end of the inner margin furthest from the body is the *hinder* or *posterior angle* (C), and in the hindwing the *anal angle* (D); and, lastly, the margin between the apex and the hinder angle is called in this book the *outer* or *exterior margin* (A C and C D); this latter margin has been termed also by some authors the *apical margin*. The term *hinder* (or *posterior*) *margin* has been used by authors with reference both to the outer and inner margins. In accordance with these terms the adjacent parts of the wing are referred to severally as the basal or sub-basal, costal or sub-costal, apical or sub-apical, anal or sub-anal, &c.—the prefix "sub" being used to denote "near to," as basal, at the base—sub-basal, near the base. When *the margin* alone is mentioned, as in describing marginal lines or rows of spots, the outer margin alone is signified. The wings are said to be *entire* when the margin is not serrated or incised in any way.

The *neuration*, or arrangement of the nervures and nervules, follows the same general plan in all Butterflies, though the diversities in detail are numerous and of great value in discriminating families and genera (see Pl. I); the *costal nervure* (*a*) starts from the base nearest the head and extends just below the costal margin, ending in that margin usually at some distance short of the apex. The costal nervure of the forewing is always simple, but in some of the *Morphinæ* it appears to throw off one or more branches towards the costal margin; in the hindwing there is also usually a small nervure called the *precostal nervure* (*j*), close to the base and between the costal nervure and the costal margin, it is short, recurved and sometimes bifid; immediately below the costal nervure is found the *subcostal nervure* (*b*), which is continued to the outer margin a little below the apex; this nervure throws off two branches or nervules in the hindwing and three, four or five in the forewing (*b*1, *b*2, *b*3). All the branches of this nervure are invariably thrown off on the upper side towards the costa, and either end in the margin near the apex, or coalesce with the costal nervure. They are numbered in order as thrown off from the base—that nearest the base being the *first subcostal nervule*, the next the second, and so on. In the *Elymniinæ* and some others there is a short slender nervule connecting the subcostal with the costal nervure near the base; the space thus enclosed is called the *prædiscoidal cell*. Below the subcostal nervure is a wide space (*h*) owing to the discoidal nervure which should follow, being either wholly or partially wanting. This space, which is usually closed by short transverse nervules, is called the *cell* or *discoidal cell*; the short transverse nervules (*g*, *g*.) closing the cell are termed the *disco-cellular nervules*, and are three in number (upper, middle, and lower) in the forewing, and two in number (upper and lower) in the hindwing, the "upper" being the one nearest to the subcostal nervure. From the points of junction of these disco-cellular nervules with each other, the *discoidal nervules* (*c*1, *c*2), two in the forewing and one in the hindwing, extend to the outer margin, these discoidal nervules being considered as branches of a discoidal nervure, which, as noted above, is either partially or wholly wanting; the discoidal cell on its lower edge is bounded by a strong nervure (*d*), termed the *median nervure*. This nervure has three branches, both in the fore and hindwings (*d*1, *d*2, *d*3), called the *median nervules*, which in this case are all invariably thrown off on the underside towards the outer margin, and being numbered in order as they are thrown off from the base, they reach the outer margin in inverse order, the first ending nearest the hinder angle, and the third nearest the apex. The lower disco-cellular nervule (when present) closes the cell by junction with the median nervure; below the median

nervure is another nervure extending from the base of the wing to near the hinder angle, and without branches, called the *submedian nervure* (*e*). This nervure is occasionally (especially in the *Papilionidæ* and *Morphinæ*) joined to the median nervure near the base, by a short connecting nervule, termed the *interno-median nervule* (not shown in the plate). Lastly, between the submedian nervure and the inner margin is occasionally found a short nervure from the base, often not extending to the inner margin, and called the *internal nervure* (*f*).

This net-work of branches greatly facilitates exact description of the distribution of the colours and position of the markings, and of the various sexual appendages which are found on the wings of Butterflies, the latter chiefly in the males. When the names attached to the various margins, nervures, and nervules are impressed on the memory, the terms denoting the various areas will be readily understood. Broadly speaking the wing is divided, for purposes of description, into the following areas :—(1), the *costal area*, between the costal nervure and costal margin ; (2), the *subcostal area* between the subcostal and costal nervures ; (3), the *discoidal cell ;* (4), the *interno-median area*, between the median and submedian nervules ; (5), the *internal area* between the submedian nervule and the inner margin ; (6), the *basal area* comprising the portion of all the above areas nearest to the base ; (7), the *apical area* near the apex ; and (8), the marginal area along the outer margin. The remaining portion of the wing between the discoidal cell and the marginal area is often loosely called the *disc* or *discal area* ; but for greater accuracy it is usual to define the interspaces between each pair of nervules. Thus, the space between the first and second median nervules is termed the *first median interspace ;* that between the second and third, the *second median interspace ;* that between the third median and lower discoidal nervules, the *third median interspace ;* that between the lower and upper discoidal nervules, the *lower discoidal interspace* ; and that between the upper discoidal and last subcostal nervules, the *upper discoidal interspace*, and so on.

The following expressions used in describing also require some explanation. When the term *both wings* is used it refers to the fore and hindwings of one side, not both forewings or both hindwings. The *length* of a wing is measured from the base to the apex ; the *breadth* from the hinder angle to the costa ; the *expanse* is usually taken as twice the length of the forewing plus the breadth of the body. A band or stripe of colour is said to be *longitudinal* when it is in the direction of the length of the wing, and *transverse* when it is in the direction of the breadth of the wing, whether fore or hind : thus, a transverse band on the hindwing can be nearly parallel sometimes to a longitudinal band on the forewing : a *macular* band is a band evidently composed of coalescing spots, and a *lunular* band is one evidently composed of coalescing lunules.

The classification of Butterflies is not of course based on the features of the perfect insect only. The egg, as has been noted above, affords no indication of the affinities of the perfect insect, though, judging from analogy, it is possible that further investigation may remove this apparent anomaly ; but the other stages of caterpillar and chrysalis furnish important, and perhaps even more critical, tests of actual affinity than the last or final stage does. In a handbook of this sort the distinctive characters of the perfect insect are more prominently put forward in any case, on account of the perfect insect being more accessible to beginners in the study ; and in this particular instance the characters of the earlier stages of Indian Butterflies, being so little known comparatively, it would be premature to attempt to give them the first place, but it is essential to note that the classification, though based nominally on the perfect insect, must be considered as open to revision, when it is found that it entails anomalous grouping of the earlier stages. Generally speaking it will be found that this is not the case, and that the genera, as now defined, group together caterpillars and chrysalises of the same general types and habits.

The sexes of Butterflies differ frequently in colouring, and almost always in outline of wings and size ; the female being usually the larger, and having the wings, especially the forewing broader and more rounded than in the males. But independently of colouring and outline, and also of internal structure, which can only be investigated by dissection under a microscope, there are in most instances external structural features by which the sexes can, with certainty and

without much difficulty, be discriminated. Throughout the families in which the forelegs are more or less imperfectly developed, including the *Danainæ*, *Satyrinæ*, *Elymniinæ*, *Morphinæ*, *Acræinæ*, *Nymphalinæ*, *Libytheinæ*, *Nemeobiinæ*, and *Lycænidæ*, the structure of the tarsus of the imperfect foreleg differs in the male and female. These differences vary in the different genera, (see Pl. I, dissections of *Junonia asterie*, *Elymnias undularis* and *Melanitis leda*, figs. *e.* and *f.*) and are detailed in the generic descriptions. In addition to the "foreleg" test the sexes of many species belonging to the above families may be recognised by marks on the wings, which occur in the male sex only. Such are the pouches on the hindwing of many species of *Danais*, the patches of silky appressed scales on the forewing of many species of *Euplœa*, the erectile tufts of hair on the hindwings of *Mycalesis* and of the *Morphinæ*, the raised stripes along the median nervules of the forewing in some species of *Argynnis*. In the *Pierinæ* the sexes almost invariably differ in colour, and the outer margin is more rounded in the females than in the males; but, with few exceptions, as for instance, the erectile tufts on the hindwings of *Catopsilias*, there are few prominent external features to distinguish the sexes. In the *Papilioninæ* the sexual distinctions, irrespective of colour and outline, are very various. *P. polyctor*, and some of its allies, have raised stripes along the median nervules of the males, as in *Argynnis*; in *Leptocercus* and in many species of *Papilio*, such as *P. zaleucus*, *P. nox*, and its allies, the abdominal margin of the hindwing is broadly folded back on to the upper surface in the males. In *Ornithoptera*, and in some *Papilios* males have a pair of conspicuous corneous valves on the last segment of the abdomen; while in *Parnassius* the *females* are furnished with a corneous pouch on this segment. In *Teinopalpus* the male has one tail on the hindwing and the female has three. Among the *Hesperidæ*, the only remaining family, the discrimination of the sexes is often a difficult matter. According to Westwood in some groups* the fore-margin (costa) of the forewing is recurved in the males, the enclosed space being thickly clothed with pale coloured down; in others the males have a large velvety patch near the base of the forewing; in others the males have a thickened oblique ridge in the middle of the forewing; and in others the form of the club of the antennæ differs in the sexes. In life the females are as a rule less active than the males, and less frequently seen on the wing. It often happens that, when males are common in collections, females are rare or even unknown, as from their more sedentary habits they are more likely to escape observation.

The powers and style of flight vary much in the different genera, so much so that a practised observer will generally readily distinguish the different genera on the wing.

The genera in many cases contain a large number of species which can be grouped under several types. Some of the largest of these genera, such as *Danais*, *Euplœa*, *Lethe*, and *Mycalesis* have in recent years been divided up into numerous groups, based chiefly, if not entirely, on the characters of the male insect. The generic value of these sub-divisions is doubtful, but their usefulness as aids to correct arrangement and identification of the species is unquestionable. In order to retain the names of these sub-divisions, many of which will probably be adopted as generic divisions in future works, but which at present we do not feel justified in using to the exclusion of the name of the larger and more completely defined group, of which they form sections, we have usually added in brackets after the generic name, the name of the minor group where it has been separately characterised.

With regard to species and varieties, we have found it convenient to describe, where there is any room for doubt, under its own distinctive name, every form that has been separately characterised. The question whether any particular form represents a species or a variety of a species can at present be decided in most instances in this country only as a matter of conjecture, for a knowledge of the life-history in all its stages is essential to the authoritative settlement of such questions; at the same time the evidently, or apparently allied species, are carefully grouped together, and the nature of the variety is indicated as closely as our present knowledge will allow.

* Exclusively American.

Thus a species, say *margarita* of *Euplœa*, belonging to the group which has been discriminated as *Salpinx*, is entered as *Euplœa* (*Salpinx*) *margarita*, and such species as *exprompta*, *nicobarica*, and *vulgaris*, which are all conjectured on very fair grounds to be merely local or geographical varieties of *Danais similis* (of China) are entered as *Danais exprompta*, *Danais nicobarica*, &c., but grouped together in consecutive order with their apparent affinities indicated.

The great importance of a correct record of exact localities cannot be too strongly insisted on. The vague localities used by the earlier writers, such as "East Indies," which may mean any portion of India, Malayana or the Malay Archipelago; or "North India," which may mean anything from the snows of Kashmir to the hot, moist, forests of Assam and Eastern Bengal, are useless for scientific purposes, and should be scrupulously avoided. Such localities have necessarily often been quoted in this book, for in some cases the Butterflies have not been captured since the original description was published, so that the exact localities of capture are still unknown. It is difficult to record on labels any full details, but in addition to the actual locality, the name of the province, and, if in a mountainous district, the approximate elevation above the sea, should invariably be noted. The date of capture too is a most valuable record, not only for information of future collectors in quest of the insect, but as a clue to whether the insect belongs to a spring, summer, or autumn brood. Doubtful localities, such as "Darjeeling," for a butterfly *purchased* at Darjeeling should be always carefully distinguished from the accurate records of places of capture. The necessity for care in this matter will be understood when it is considered how the Indian Empire is situated. There is a fairly typical "Indian" fauna, as represented by the central portions of Continental India and the Peninsula, but on the West Coast, stragglers from the African and South Palæarctic fauna may be found. In the North West, and also in the higher ranges of the Himalayas, the Eastern Palæarctic forms occur; on the east the Indo-Malayan fauna is largely represented, and many of the typical Malayan forms occur; and it is of great importance to ascertain, as accurately as possible, the extreme ranges to which the various types extend.

COLLECTING AND PRESERVING.

To start with, a net is the first essential required. In England apparatus for collecting is to be obtained at any of the established Naturalist's shops; in India one has to depend a good deal on one's own ingenuity to supply one's wants in this respect. The main point to aim at is lightness, so far as is compatible with rigidity, of the frame and handle, on which the handiness of the net largely depends. Probably the simplest form of net is somewhat oval in shape, and made of three joints, which can be rivetted together or not at the discretion of the user. For this kind of net all that is required is to have made by any bazar blacksmith a brass Y and two ferules. The Y should be made of three tubes, the lower one somewhat larger and longer than the other two that form the branches. In the lower one a strong, *rigid*, stick is fitted, and for general collecting the stick should not be less than five or six feet in length, though for collecting small "Blues," &c., a shorter stick will be found much more handy. Again, for taking insects that fly high and settle on the upper branches of trees, a pole, 20 or 30 feet in length, may be required. The framework of the net should be in three pieces; the two side pieces (fitting at their bottom ends into the two upper branches of the Y) should be of very tough rigid wood. On their further ends the two ferules are fixed, one end of each being fastened with a rivet, so precluding any chance of the ferule falling off and getting lost. The top of the net may be made of a piece of rattan cane. The circumference of the net when fitted together should again depend upon circumstances. One fifty inches round is a good sized general net, but will be found much too small, unless very skilfully used, to catch the large, fast flying *Papilios*, &c. Probably a net 70 to 80 inches round will be found the most generally useful, particularly in rich localities. where the larger insects abound. Nothing is more annoying than to lose a large, fine insect, which may be very rare, because one's net is an inch or so too narrow! For a small pocket net one made with the joints folding like the old fashioned parasol, the handle of which doubles up in the middle, will be found very useful.

The framework should be made of four pieces of rattan cane, each piece bent by steaming into a quarter circle, the two end ones fitting, as in the larger net, into a Y-piece. This is a capital net for small insects, and has the great advantage of being easily put together and being "carriable" in an inside pocket. The net itself is a simple bag; a broad hem made of very coarse cotton cloth is made for the framework to run in, the bag being made of any length thought advisable. For the larger net four feet is not too long; about three feet will suffice for the smaller net, the framework of which should not exceed a yard in circumference. Common mosquito netting is a good material for the net; green gauze is better, but is more difficult to obtain; the flimsier the material used, the less is the risk incurred of injuring the insects.

A collecting box is the next essential. It should be made of zinc, and have pieces of sheet cork fixed to the lid and bottom inside by clamps. The box should be made to fit an outside pocket. When starting on a day's collecting, the cork should be well wetted, so that the specimens pinned into it remain limp till they are ready to be set. If the cork is not damped, specimens will get as dry as a chip in an hour or two under the hot sun of India, and require to be relaxed to be set. During a journey, when specimens cannot be set the same day, or when specimens are required to be sent long distances, either for custody or exchange, it is best to put them at once into paper cases. For this purpose a supply of paper should be kept ready, cut into oblongs of various sizes, a little longer than they are broad. Thin Serampore paper, or the thinnest printing paper, answers best; each paper should be folded diagonally once, with the two ends projecting, so that by folding over the right hand edge to the right, and the left hand edge to the left, a closed triangular pocket is formed, in which the Butterfly can be placed. Great care should be taken that the ends fold over the reverse ways, for then the pocket can be easily opened without damage to the Butterfly inside. Only one Butterfly should be put in each paper, and when putting it in the wings should be folded together over the back, and the antennæ put back carefully against the wings. Care should always be taken to prevent injury to the legs and antennæ if the species are to be of any value for scientific purposes. On each paper should be roughly noted the date and place of capture. Specimens thus packed can be safely kept and transported, and can be relaxed at any time. For relaxing two methods are available—first, a zinc box lined with cork well damped inside; second, an unglazed earthen *ghurra* fitted with a top, and containing about two inches of well damped sand. The mouth of the *ghurra* should be wide. The insects to be relaxed should be laid on the damp cork or sand and then closed up, the *ghurra*, if one is used, being wrapped with damp cloths. In a few hours the specimens will be found ready for setting.

Pins are next required. By sending a Post Office Money Order to Messrs. D. F. Taylor & Co., New Hall Works, Birmingham, England, for a sovereign, and specifying the sizes of pins required, a supply will be sent by overland parcel post which will last an ordinary collector for five years. Nos. 11, (large, for *Papilios*, &c.), 12 (medium sized, the pin most wanted), and 6 (small size for "Blues," &c.) will be found a good selection.

Setting boards are required to spread out the insects on when caught and before placing in the collection. They can by easily made out of *Semul* or other soft wood, and should have a groove for the body, regulated in size according to the size of the bodies of the Butterflies intended to be set on them, and a smaller groove in the centre of the larger one for the reception of the pin. In making these boards great care should be exercised in making the pin groove in all the boards of equal depth, which should be one-third of an inch from the bottom of the body-groove. If this is not attended to, it will be found that, when the insects are taken off the boards and placed side by side in the store-box or cabinet, being at different heights on the pin, they present a very irregular appearance, all up and down, no two insects at the same level. Uniformity in setting adds greatly to the beauty of a collection. Boards should be made of all sizes—from half-an-inch broad for the tiniest "Blues" to eight inches for the gigantic *Ornithopteras*. The boards should also gently slope downwards on each side from the centre groove, not too much, say about 10°, and the slope in all the boards should be the same.

Lastly, places in which to store the insects, when caught and set, are required. The best are English-made mahogany cabinets, the drawers eighteen inches square, and about two inches deep, with a glass cover to each drawer, and a camphor cell round each. Such cabinets cost from £1 to £1-5 a drawer in England, so are very expensive; but there is nothing like them for preserving the specimens. The next best things are cork-lined store boxes with a single camphor cell, and fitting very closely. Any good native carpenter can turn out such boxes, and instead of cork, *sola* pith can be used; cut into strips and pasted on the top and bottom of the box with a double layer of moderately thick paper over it, it answers all purposes. The most useful size for store boxes is eighteen inches long, twelve broad, and three deep. If the boxes are all made of the same size, they can be packed very easily into a larger outer box, which is an additional security against mites and mould, the two great enemies to the collector in India. Such store boxes do not require glass covers. The supply of camphor in each box should be kept up most carefully, or else mites will destroy in a very short time the results of one's labors, and as an additional protection, if the insides of the boxes are occasionally painted over with a few drops of oil of aniseed, lemon grass oil or any "essential" oil to be obtained at a chemist's, mites will never shew themselves. Should they do so, a few drops of benzine or benzine collas dropped on the specimens affected, will destroy every mite without injuring the specimens in the least if the benzine is pure, but the benzine should first be tried on a *common specimen* to ascertain its purity, or rare specimens may be injured. Very often an insect will go greasy. To remedy this one has only to immerse the specimen bodily, pin and all, in a bath of benzine; take it out after a few minutes and leave the benzine to evaporate, and it will be found that, not only has the specimen not been injured at all, but that the grease has entirely disappeared, and the specimen is restored to all its original beauty. While the benzine is evaporating, and until the colours return, the specimen should be kept in a separate box in which the air can circulate.

Each specimen, when caught, should have a small label with the exact locality where caught, and date when captured, placed, face downwards, on the pin beneath it. A collection should be arranged in rows, one specimen behind another; the males at the head of each row, the females following, and the name of the specimen ending each row. When a collection embraces specimens from various localities, it is an advantage to place a label at the side of and below each specimen, shewing where it was taken. This does away with the necessity of taking up each specimen to read the label beneath it, when its place of capture is required to be known, but under no circumstances should the label beneath the specimen be dispensed with, since from every point of view, a collection of insects with the specimens all properly 'localized' is worth far more than one in which the localities of the specimens have not been retained.

For further useful information on these, and on all other matters connected with the collection of insects, including the collecting and management of eggs, caterpillars and chrysalises for breeding, we would recommend collectors to obtain Dr. H. Guard Knaggs' "Lepidopterists' Guide for the use of the young collector," published by John Van Voorst, 1, Paternoster Row, London, E.C., the new illustrated edition of which can be bought for one shilling.

SYNOPSIS OF THE FAMILIES AND SUBFAMILIES.

RHOPALOCERA.

FAMILIES.

I.—NYMPHALIDÆ, with the FORELEGS very feebly developed in both sexes, short, imperfect, and unfitted for walking. FOREWING with the subcostal nervure emitting four branches exclusive of terminal portion.

I.—DANAINÆ: BODY, long, slender; ANTENNÆ, not half the length of forewing, gradually clavate; PALPI, *short, divergent, erect, very slightly compressed, clothed with dense short porrect hairs;* WINGS, entire, rather lengthened, never dentate or caudate; CELL, closed in both wings; FOREWING, nervures never dilated at base, upper disco-cellular minute or wanting, internal nervure slender, running into the submedian near its base; HINDWING, discoidal nervure appearing as a third subcostal nervule, no prædiscoidal cell.

II.—SATYRINÆ: BODY, short, weak; ANTENNÆ, short, slender, club usually slender but variable in shape; PALPI, *moderately long, divergent, erect, very much compressed, and clothed in front with long porrect hairs;* WINGS, broad, sometimes rounded, often dentate, occasionally falcate in forewing and slightly caudate in hindwing; CELL, closed in both wings; FOREWING, with the nervures generally dilated at base; HINDWING, with no prædiscoidal cell.

III.—ELYMNIINÆ: BODY, rather robust; ANTENNÆ, short, slender, with long, slender, gradually formed club; PALPI, *long, divergent, porrect, nearly straight, only slightly compressed, clothed with short appressed hairs longer on the back edge;* WINGS, dentate, or angled; CELL, broad, generally closed in both wings by long, slender, much curved nervules; FOREWING, with the costal nervure only slightly dilated at base; HINDWING, *furnished with a prædiscoidal cell.*

IV.—MORPHINÆ: BODY, robust, seldom elongate; ANTENNÆ, long, slender, with a slender club; PALPI, *small, wide apart, erect,* (elongate and porrect in *Amathusia* and *Zeuxidia*), *front edge narrowed and sharp, clothed with scales or scaly appressed hairs, the back edge often hairy;* WINGS large, broad, ample, sometimes rounded, sometimes with a short broad tail; CELL, in forewing broad, closed—in hindwing open; FOREWING, with the nervures not dilated at base (except in *Clerome*), the costal nervure sometimes appearing as if branched; HINDWING, with no prædiscoidal cell.

V.—ACRÆINÆ: BODY, long, rather stout; ANTENNÆ, short, abruptly clavate, the club obtuse at tip; PALPI, *long, divergent, erect, hairy, the second joint somewhat swollen;* WINGS, long, narrow, entire, never dentate or caudate; CELL, closed in both wings; FOREWING, nervures not dilated at base; HINDWING, with no prædiscoidal cell, *not channelled* to receive abdomen: NEURATION as in *Danainæ.*

VI.—NYMPHALINÆ: BODY, robust; ANTENNÆ, long, with a broad elongate distinct club; PALPI, *large protruding, wide apart, scaly, the front edge broadly dilated;* WINGS, large, triangular, but varying much in outline; CELL, sometimes closed in both wings, often open in hindwing, and sometimes open in forewing also; FOREWING, nervures not dilated at base, (except in a few genera, *Ergolis, Eurytela,* &c., in which the costal nervure only is dilated), the second subcostal nervule emitted before end of cell; HINDWING, *channelled* to receive abdomen, no prædiscoidal cell.

II.—LEMONIDÆ, with the FORELEGS small, slender, imperfect, but more developed than in the *Nymphalidæ*; those of the *males* brush-like and clothed with long hairs, the tarsus without joints or claws; of the *females*, longer, slender, scaly, tarsus with the joints longer and more distinct than in the *Nymphalidæ*. FOREWING, subcostal nervure generally with only three branches, the disco-cellulars very slender. All of small size.

I.—LIBYTHÆINÆ: BODY, robust; ANTENNÆ, short, stout, incrassate, or gradually clavate; PALPI, *very long, protruding, united at tip, forming a long conical beak*; CELL, in both wings, closed; FOREWING, very falcate, upper disco-cellular minute.

II.—NEMEOBIINÆ: BODY, slender, or somewhat robust; ANTENNÆ, moderately long, slender, and abruptly clubbed; PALPI, *very small and slender, scarcely advanced in front of the face, the last joint nearly naked*; CELL, in both wings, closed; FOREWING, with the upper disco-cellular obliterated; HINDWING, very variable in shape, *slightly channelled* to receive the abdomen.

III.—LYCÆNIDÆ, with the FORELEGS slender and evidently smaller than the rest, but nearly alike in the sexes, used for walking, scaly; tarsus of the *male* long, exarticulate, that of the *female* jointed like in the hindlegs. FOREWING, with the subcostal nervure emitting only two, or three, branches; the discoidal cell generally narrow owing to the distance between the costal and subcostal nervures. All but one or two of small size. BODY, rather slender; ANTENNÆ, short, often ringed with white, with an elongate distinct club; PALPI, *elongate, terminal joint, slender, horizontal and nearly naked*. HINDWING, scarcely channelled to receive the abdomen, often with one or more slender tails; precostal nervure apparently wanting.

IV.—PAPILIONIDÆ, with ALL SIX LEGS perfect. WINGS, with the discoidal cells always completely closed; some of the subcostal nervules of the forewing emitted beyond the end of the cell.

I.—PIERINÆ: BODY, slender, or moderately robust; ANTENNÆ, elongate, with an ovate club, or short, incrassate and truncate; PALPI, rather long, porrect, often hairy; FOREWING, *with lower discoidal nervule manifestly distinct from the median nervure*; HINDWING, *channelled to receive the abdomen*; TIBIA of foreleg without any spur in the middle.

II.—PAPILIONINÆ: BODY, short, somewhat robust; ANTENNÆ, gradually clavate, club elongate, sometimes tapering; PALPI, short (except in *Teinopalpus*), pressed close to the face, densely clothed with scales and hairs; FOREWING, *with the lower discoidal nervule united to the third median, and appearing like a fourth median nervule*; HINDWING, never channelled to receive the abdomen; TIBIA of foreleg, with a stout spur about the middle.

V.—HESPERIDÆ, with ALL SIX LEGS perfect. WINGS, with the discoidal cell of hindwing slenderly, and often incompletely closed, subcostal nervure of forewing always with four branches, all four emitted before end of cell. Of small size, very robust build and rapid flight. BODY of all but a few very robust; ANTENNÆ, wide apart at base, with a thick club, or strong curved hook at tip; PALPI, short, very broad, closely pressed against the face, densely squamose. HINDLEGS, generally with a pair of movable spines at the tip of the tibiæ, and another pair in the middle; MIDDLE LEGS with a pair of movable spines at the tip of the tibiæ.

The foregoing table is drawn up in accordance with the arrangement adopted in Kirby's "Synonymic Catalogue of Diurnal Lepidoptera," that being the only complete catalogue of the suborder yet published; but there are many points on which the arrangement is open to revision, and possibly improvement, when the life-history of exotic Butterflies becomes more fully known. The position of a few genera has already been altered.

The primary divisions into families are based, as regards the perfect insect, mainly on the structure of the legs, and especially on the extent of development of the forelegs.

The secondary divisions into subfamilies are far less clearly marked, and it is difficult to find distinctive characters of sufficient importance to maintain some of these divisions. The characters given in the table are merely a few of the more important, the remaining characters being detailed in the body of the work.

In the subfamilies of the *Nymphalidæ* the most important test is the structure and clothing of the labial palpi, but even the palpi are not uniform throughout the genera of each subfamily; each division naturally may be expected to embrace, in addition to the more typical genera, aberrant forms showing approaches to other types, and with these there is sometimes considerable difficulty in determining their affinities. The characters given in the table, taken as a whole, will usually be sufficient for identification.

The *Danainæ* form a well-marked group, and as far as the Indian genera are concerned, no doubt has ever been raised as to the propriety of retaining each and all of them in their present places; their nearest allies are the American subfamily *Heliconiinæ*, which latter have no representatives in Asia.

The *Satyrinæ*, too, form a well-marked group, mainly distinguished structurally by the long hairs of the palpi. This character is not fully developed in all the genera, but no genera are included among the Indian *Satyrinæ*, the position of which in the present subfamily has been considered doubtful. One or more of the nervures of the forewing are often, if not always, much dilated at the base; the dilation of the costal nervure occurs also in *Elymnias* and in some genera of *Nymphalinæ*, but the dilation of the subcostal and median nervures is, where it occurs, characteristic of the *Satyrinæ*. The *Satyrinæ* are found in all parts of the world, but are most numerous proportionally in temperate climates.

The *Elymniinæ* in this arrangement are restricted to two very closely allied genera, which, with the exception of a very few east African species, are entirely Asiatic, and the bulk inhabit the Malay Archipelago. They are very closely affined to the *Satyrinæ*, but differ in the clothing of the palpi, and in the presence of a prædiscoidal cell in the hindwing. Westwood included them with *Eurytela*, *Ergolis* and *Hypanis*, (which also have the costal nervure dilated at base) as a separate subfamily under the name of *Eurytelidæ*, and there is a good deal to be said in support of this arrangement; the latter genera are now included among the *Nymphalinæ*, and they form a link between that subfamily and the *Satyrinæ* and *Elymniinæ*.

The *Morphinæ* include several genera (*Amathusia*, *Zeuxidia*, *Enispe*, and *Discophora*) which were included by Westwood among the *Nymphalinæ*, and also one genus, *Xanthotænia*, which Kirby even now includes among the *Nymphalinæ*. The genera which should compose this subfamily, and even the right of this to the rank of a subfamily at all, have been frequently disputed. Horsfield and Swainson grouped it with the *Satyrinæ*; some of the American group have a prædiscoidal cell, showing affinity for the *Elymniinæ*, and some American genera have the discoidal cell in the hindwing closed. These American forms are included in a separate subfamily, *Brassolinæ*, which has no representatives in India. But the characters given in the table will define the Indian genera, and, though numerous divergencies in structural detail exist even among these, the group is clearly a natural one.

The *Acræinæ* contain only two Indian species, which were formerly considered to represent different genera, but now are included in a single genus. About fifty species are found in Africa, one in the Malay Archipelago, one in Australia, and between twenty and thirty in America. So far as the Indian species are concerned, this group is abundantly distinct. The American *Heliconinæ* are closely related to this group.

The *Nymphalinæ* embrace the widest differences of form, outline and even structure, the long and distinctly clubbed antennæ and the protruding dilated palpi being the most

constant features. As arranged in this work they exclude, as stated above, certain genera now included among the *Morphinæ*, and they include other genera which are equally closely allied to the *Elymniinæ*. The minor structural differences to be found within this group will be detailed further on.

The remaining groups, *Libythæinæ*, *Nemeobiinæ* (or *Erycininæ* of Westwood), *Lycænidæ*, *Pierinæ*, *Papilioninæ* and *Hesperidæ* need no remark; the characters are well defined, and the allocation of the genera composing the groups is undisputed.

FAMILY 1.—NYMPHALIDÆ.

This family includes the whole of the great division of Butterflies in which the fore-legs of the perfect insect are undeveloped, having the tarsus rudimentary in *both* sexes. As thus defined it includes all genera in which the chrysalis is simply suspended by the tail and not girt about the body by a thread, (see Plate II, *Athyma leucothoë* and *Adolias lubentina*), with the single exception of the genus *Libythea*, which forms the link between the *Nymphalidæ* and the next family, *Lemoniidæ*. *Libythea* is a very distinct form; it was placed as a separate family by Westwood, and is still retained as a separate subfamily by Kirby; it is classed with *Lemoniidæ* rather than with *Nymphalidæ*, on account of the structure of the forelegs.

It also includes two distinct types of caterpillar:—the "Scolopendriform" (see Plate II, *Athyma leucothoë*), and the "Thysanuriform" (see Plate II, *Adolias garuda*), sections of Horsfield's classification of 1857.

In the aspect of the perfect insect, the *Nymphalidæ* vary greatly; in shape from the long wing of *Hestia* to the short deep wing of *Kallima*; in colour from the sombre *Satyrinæ* to the brilliant *Euplœa* and *Apatura*; in size from the tiny *Ypthima* to the gigantic *Thaumantis*; in structure from the weak *Erebia* and the delicately formed *Cyrestis* to the strong and rapid *Charaxes*; in habit too there is an equally wide divergence, from the shade-loving, sometimes crepuscular *Melanitis* to the *Vanessa*, which basks in the hottest sunshine; but throughout the family the small undeveloped foreleg folded closely against the thorax is a constant and well-marked feature.

SUBFAMILY I.—DANAINÆ,* Bates. (PLATES III TO IX INCLUSIVE.)

Danainæ, Bates, Journ. Ent, vol. ii, p. 176 (1864); *Danaidæ*, Felder, Wien. Ent. Mon., vol. vi, p. 74 (1862); *Danaidæ*, Doubl., Gen. D. L., p. 84 (1847).

HEAD, round. *Eyes*, oval, prominent. *Labial palpi*, divergent, ascending, scarcely rising above the forehead, distinctly triarticulate; the basal joint short, stout, curved; second double the length of the first, subcylindric, slightly curved, rounded at each extremity; third minute, about one-fifth the length of the second, obovate, slightly pointed. *Antennæ*, gradually clavate. *Thorax*, moderately stout. FOREWING, elongate, the *cell* closed; the subcostal nervure always with four branches exclusive of the terminal portion; the first nervule thrown off before the end of the cell, generally distant, at its origin, about one-fourth the length of the cell from the disco-cellular nervule, the second thrown off at the end of the cell or very little before it, the third rather more distant from the second than from the fourth, the fourth about midway between the third and the apex. *Upper disco-cellular nervule* very short, or altogether wanting; *middle* and *lower*, about equal in length; *internal nervure* slender, running into the submedian, causing the latter to appear as if double at its

* In his recently published "Lepidoptera of Ceylon," Mr. F. Moore alters the name of this subfamily to *Euplœinæ* with the following remark: "Linnæus's name of *Danaus* having been adopted in a generic sense by Esper in 1777, and also by Panzer in 1801, for species of *Pierinæ*, its use—as applied by Latreile in 1809, cannot be retained in this group of butterflies." Possibly this may be strictly correct; but as the name of *Danais* has been in general, if not universal, use in connection with the present subfamily for upwards of seventy years, and as its use in this sense cannot possibly be misunderstood, we have deemed it advisable to retain it here. It is so interwoven with this sense in all entomological literature that it seems a pity to have disturbed its claim to acceptation on account of an objection founded solely on works which are practically obsolete.

base. HINDWING obovate, the cell closed; the *discoidal nervure* always appearing to be a third subcostal nervule; *abdominal fold* mostly ample. LEGS, (except the forelegs) rather stout and long; *forelegs* imperfect, varying in the sexes; *middle* and *hindlegs* with the *tibiæ* spiny; the *spines* not strikingly developed; the *tarsi* with the basal joint long; second, third, and fourth progressively shorter; fifth longer than the second; all spiny at the sides below; *claws* simple. ABDOMEN, rather slender, nearly as long as the abdominal margin of the hindwing.

CATERPILLAR.—Stout, cylindrical, smaller towards the head, furnished on one or more of the anterior segments with a pair of long, slender, flexible, fleshy tentacula, not retractile; and with a similar, but often shorter, pair on the penultimate segment *(Westwood)*. The anterior pair of these processes in all *Danais*, and almost certainly in all *Hestia*, are articulated and freely movable at the base and function as antennæ *(J. Wood-Mason)*.

CHRYSALIS.—Suspended, short, smooth, somewhat ovate, contracted near the middle *(Doubleday)*, often with brilliant metallic colouring.

The *Danainæ* are insects of large or moderate size, of slow flapping flight when undisturbed, and of fearless demeanour. They include some of the very commonest of Indian Butterflies, and the commoner species are not only wide-spread, but they occur in most parts in very great numbers. Their fearlessness is evidently the result of the freedom that they enjoy from the attacks of insectivorous birds and reptiles, which they owe to the presence of a pungent semi-aromatic odour pervading the juices of their bodies; these juices, when exuded by pressure, stain the skin yellow and leave a distinct odour; their bodies are moreover very tough and leathery, and they have great tenacity of life, so that any individual which might be accidentally seized and afterwards dropped by a bird, has a good chance of escaping with immunity when more delicately framed insects would be killed or hopelessly maimed. The males often bear curious sexual marks on the wings, and have besides the power of extruding and expanding two long brushes of yellow hairs from their anal extremity which have been thought to disseminate the odour with which the insects are furnished. In connection with the immunity from persecution which these insects enjoy, it is worthy of note that many species belonging to widely different genera, such as *Elymnias*, *Hypolimnas*, some of the *Pierinæ*, *Papilioninæ*, *&c.*, which altogether lack this kind of protection, are found to closely resemble in outward appearance and style of colouration certain species of *Danainæ* which frequent the same localities at the same periods; such genera are termed "mimetic," with reference to this habit of mimicry, which is a subject of great interest and importance for investigation. Regarding the gregarious habits of these insects, Dr. Thwaites* writes from Ceylon: "On a fine sunny day, when calm or nearly so, amazing numbers of one or more species of *Euplœa* may often be observed wending their way in one direction, as if floating upon the air a few feet from the ground, with an apparently sluggish movement of their wings, though really making rapid progress." Captain C. H. E. Adamson also writes that, on one occasion near Moulmein, on the 12th June, he found hundreds of *Euplœæ* of numerous species, all congregated round a single flowering tree in the jungle, at a time when scarcely a single *Euplœa* was to be found elsewhere in the neighbourhood. Mr. Harold Fergusson has observed much the same habit in *Hestia lynceus*, and every one who has paid attention to the subject in this country must have observed the swarms of the common *Danais chrysippus*, *D. genutia*, and *Euplœa core* to be found from time to time in various localities. All the *Danainæ* have the costal and subcostal nervures of the forewing rather widely separated; also the peculiar structure of the internal nervure noted above. They are found in all the four continents and in Australia, though as a rule confined to tropical and sub-tropical regions. The Indo-Malayan region, where the species are very numerous, appears to be the head-quarters of the subfamily. The distinctive characters of the Indian genera are shown in the following table:—

* "Lepidoptera of Ceylon," by F. Moore, F.Z.S.

Key to the Genera of DANAINÆ.

A. Antennæ almost filiform, scarcely perceptibly clavate. Of large size; wings elongate, diaphanous, white with black or blackish spots and marks; no sexual pouch on hindwing of male. *Claws furnished with paronychia and pulvilli.*

I.—HESTIA.

B. Antennæ distinctly clavate.

a. Claws without paronychia or pulvilli.

*a*¹. With *no sexual spot on hindwing* of male. Smaller than *Hestia*, but similar in form and colouration.

II.—IDEOPSIS.

*a*². Generally with *sexual spot or pouch on hindwing* of male. Wings yellowish brown, or bluish or greenish white, bordered and more or less streaked with black.

III.—DANAIS.

b. Claws furnished with paronychia and pulvilli. The sexual marks, usually on forewing of male; wings various shades of velvety-brown or black, often brilliantly glossed and spotted with blue, and often with white spots near the outer margin.

IV.—EUPLŒA.

The genera of *Danais* and *Euplœa* have been further subdivided into minor groups, based mainly on the form and position of the sexual marks in the males; these subdivisions are indicated under each generic head, but the generic names, as defined above, are retained, as they alone appear to have full generic value.

Genus 1.—HESTIA, Hübner. (PLATES III & IV).

Hestia, Hübner, Verz. bek. Schmett., p. 14 (1816); Doubl., Gen. D. L., p. 94 (1847); Butler, Trans. Ent. Soc. Lond., series iii, vol. v, p. 467 (1867) *Monograph; Idea*, Fabricius, Ill. Mag., vol. vi, p. 283 (1808); Latr., Enc. Méth., vol. ix, p. 10 (1819), *Nom. Spec.* Horsfield, Cat. Lep. E. I. C., pl. iii, n. 28 a. b, c, d (1828).

ANTENNÆ, more than half the length of the body, slender, almost filiform, scarcely thickened at the apex. FOREWING, ample, elongate, somewhat oval; the outer margin sometimes sinuate, especially in the males. *Costal nervure* and first subcostal nervule anastomosing; *upper disco-cellular nervule* short but distinct. HINDWING, elongate, obovate; the abdominal fold almost wanting in the MALES, distinct in the FEMALES. FORELEGS, clothed with scales; the *femur* and *tibia* of about equal length; the *tarsus* of the MALES about one-third the length of the tibia, cylindrical, tapering towards the apex, sometimes showing indications of being four-jointed, sometimes constricted near the base, without any signs of articulations. *Tarsus* of the FEMALES clavate, four-jointed, each joint, except the fourth, armed at the apex with a spine on each side. MIDDLE and HINDLEGS, of moderate length; *tarsi*, long, with the last joint dilated. CLAWS, curved, rather short. PARONYCHIA with the outer lacinia strap-shaped, longer than the claw; inner lanceolate, more than half as long as the claw. PULVILLUS jointed, nearly as long as the claw, the second joint broad and corneous.

CATERPILLAR.—Unknown. CHRYSALIS.—Typical as in the subfamily. A chrysalis of *Hestia belia*, Westwood, is figured in Horsfield and Moore's Cat Lep. E. I. C., vol. I, pl. iv, fig. 12 (1857), from Java.

The *Hestias* are remarkable Butterflies, of large size and with elongate wings; they are essentially tropical insects. About fifteen species are known, all from the Indian or Indo-Malayan regions. Within our limits they seem to be confined to Ceylon, the south of the peninsula and along the western Ghâts to the south Concan, reappearing on the east in Burma and the Andaman Islands. The texture of the wings is delicate, and the colour throughout the group is semi-transparent white or greyish white, sometimes pure, sometimes powdered with blackish scales, with the nervures and numerous spots and marks black. They fly slowly over the tops of bushes and trees, often at considerable height from the ground, but when within reach are not difficult to capture. They are essentially forest-loving insects, and frequent the neighbourhood of pools and streams. Locally they are known by various trivial names, often very appropriate, such as "floater," or "silver paper fly," or "Sylph," in Ceylon; "spectre" or "ghost" in south India; "widow" in Province Wellesley, &c.

The Ceylon species, *H. jasonia*, has been placed by Moore in his recent work on the Lepidoptera of that island under the genus *Nectaria* of Dalmann, which embraces a section

of the genus *Hestia* of Hübner. The characters of this genus, as extracted below from Moore's work,* accord well with those of the Indian species, except that these latter have the disco-cellulars of the hindwing bent inwards, not outwards, but the two form an outward angle at their junction.

Key to the Indian species of HESTIA.

A. With the white ground-colour reaching the margin of the wings between the marginal spots and markings.

a. With the black band across the forewing consisting of a patch above and a distinct patch in the cell; the subapical spots small and separate.

*a*¹. Of large size (Expos 5 to 6·5 inches); ground-colour typically grey.

1. H. LYNCEUS, Travancore to Mysore.

H. IDEA, Malayana.

*b*¹. Of smaller size (Exp. 4·5 to 5·5 inches); ground-colour pure diaphanous white.

2. H. MALABARICA, Western Ghâts, Concan.

H. LINTEATA, Malacca.

b. With the patch in the cell large and confluent with the black costal patch above; the subapical spots elongate and coalescing.

*a*¹. With the inner margin white below the submedian nervure.

3. H. JASONIA, Ceylon.

*b*¹. With the inner margin entirely black below the submedian nervure.

4. H. AGAMARSCHANA, Andamans, Mergui.

B. With the black marginal spots coalescing on the border, the white ground-colour especially on the hindwing not reaching the margin.

a. With the border spots only partially coalesced; the ground-colour white irrorated with black scales.

5. H. CADELLI, South Andamans.

b. The border spots all completely coalesced; the ground-colour pure fleckless white.

6. H. HADENI, Bassein, British Burma.

Many of the species are very closely allied, and the specific differences require further study, especially with regard to geographical distribution. The Mergui specimens of *H. agamarschana* approximate to *H. jasonia* in the presence of the second interno-median spot on the hindwing. The coalescing of the spots on the apical half of the forewing and along the margin of both wings in *H. cadelli* show an approach to *H. hadeni* of Burma rather than to *H. jasonia* of Ceylon. *H. jasonia*, too, appears to be distinct; but between *H. lynceus* and *H. malabarica* there appears to be no constant difference except size, unless the white specimens from Travancore, as large as *H. lynceus*, are really *H. malabarica*, in which case the sole difference is in tone of ground-colour, as the markings are absolutely identical. Out of a large series of *Hestias* from the south Concan sent by Mr. G. Vidal, C.S., there is not a single large or grey specimen, all belonged to the small and white type; and again out of six or seven specimens sent by Mr. Harold Fergusson from the Ashamboo range in Travancore, there were none of the small kind, all were very large; but while none were as grey as the typical *H. lynceus* some were almost as white as typical *H. malabarica*. The most typical specimens of

* *Nectaria*, Dalm., in Billb. Enum. Ins., p. 76 (1820). "Wings semi-diaphanous, large; forewing lengthened, triangular; costa slightly arched; apex quite convex; exterior margin very oblique, waved; posterior margin short, slightly concave in middle; costal nervure extending to half the length of the wing; subcostal with first branch emitted at some distance before end of the cell, and anastomosed to the costal near its end; second branch from near end of the cell; third and fourth at equal distances beyond; the fourth terminating above and the fifth below the apex; cell long; upper disco-cellular inwardly oblique and slightly angled near subcostal, lower outwardly convex; first radial from angle of the upper, and second from near upper end of lower disco-cellular; three median branches wide apart; submedian very recurved. Hindwing lengthened, oval; costal margin curved; apex convex and more or less prolonged; exterior margin slightly waved, anal angle convex; costal nervure short, with a basal forked spur; subcostal branches wide apart, first very short; disco-cellulars bent outward at their middle, the radial emitted from the angle; median branches wide apart; submedian and internal nervures slightly recurved. Body long, slender; palpi porrect, pilose above and beneath; tip pointed; legs long, slender; antennæ slender." (*Moore*, l. c).

H. lynceus are from the Wynaad, from whence they were sent by Mr. Rhodes Morgan, although numerous specimens in the Indian Museum, Calcutta, from the Kadur District, Mysore, are equally typical as regards the dark-grey ground-colour, though somewhat smaller in expanse. The large Travancore race has been retained for the present as *H. lynceus*, but the point requires further investigation. *H. kadeni* with its very broad pure black border is the most distinct of all the species.

1. Hestia lynceus, Drury.

Papilio lynceus, Drury, Ins., vol. ii, p. 12, pl. vii, fig. i (1773); *Hestia lynceus*, Doubl. and Hew., Gen. D. L., p. 95 (1847), Horsfield and Moore, Cat. Lep. E. I. C., vol. i, p. 134 (1857).

HABITAT : South-west peninsular India ; and Malayana.

EXPANSE : 5·3 to 6·3 inches.

DESCRIPTION : "UPPERSIDE, all the wings appear almost transparent and of a glassy hue, having a great number of black spots like velvet on them, of different shapes and sizes, some being round, some oblong, and others like streaks, there being on each *forewing* twenty-eight distinct ones, besides those placed near the anterior edges, which are not easily ascertained from their running into one another ; the *hindwing* has thirty-three distinct spots like those on the forewing, whereof some appear double. UNDERSIDE, exactly similar to the upperside. The edges of both wings plain and even." (*Drury*, l. c.)

The above somewhat quaint description is taken from the original by Drury ; it is not very definite, but an examination of the plate, though the colouring is overdone, leaves no doubt that the large *Hestias* from the Wynaad are identical with *H. lynceus*, Drury, the expanse of which is 6·3 inches.

The following is a detailed description of the Wynaad species. *Forewing*, with the space between the costal nervure and the margin black for about one-third the length of the wing from the base, then merging into a black spot extending from the margin to the subcostal nervure ; beyond this the costal margin is alternately striped white and black. In the cell are three black streaks, the upper one starting from the subcostal nervure, the two lower united towards the base which they do not quite reach ; beyond the middle of them is an irregular black patch usually not reaching the nervure on either side ; at the end of the cell the disco-cellular nervules are broadly defined with black ; a discal series of seven black spots, of which the three nearest the costa are parallel to the end of the cell, and the next four parallel to the outer margin ; within this row is an irregular black patch on a black stripe between the median and submedian nervures, and a round black spot between the first and second median nervules ; beyond the discal series is a submarginal row consisting of pairs of conical spots placed by the nervules, one on each side of each, and coalescing, and a marginal series, consisting of a conical spot on each nervule with the base outwards and the apex coalescing with the submarginal row, and between each pair of nervules an elongated spot ; a narrow black marginal line extends completely round both wings. On the *hindwing*, the markings correspond with those on the forewing ; the marginal, submarginal and discal series are similar in style and arrangement, but within the cell there are only two black streaks, the upper one with a short branch near the end. The ground-colour of both wings is semi-transparent white, covered with minute black irrorations giving it a greyish tone. The FEMALE differs from the male in being somewhat larger, the forewing broader and less emarginate. The Travancore specimens correspond entirely with the above in markings, but the ground-colour is purer and more opaque white, the black irrorations being confined to the outer half of the wing, or in some cases entirely wanting.

Hestia lynceus appears to be fairly common in the hilly districts of Travancore, but is rather local. Mr. Harold Fergusson writes : "On one occasion, on the 16th February, in a patch of heavy forest at about 3,500 feet elevation, I saw numbers of this *Hestia*. There must have been at least a hundred floating about the trees some twenty feet from the ground. I had seen none before this in any of the other forests, so I should think that they must

be local." * * * "Later on during April they were not uncommon, but seldom numerous, * * * and throughout May they were common in the hills in suitable localities." They seem to occur only on the hills, not lower than 1,000 feet elevation, and to frequent forests. In the Kadur District, Mysore, at about 2,500 feet elevation, it has been found common in August, October, and November, by Mr. G. H. Kearney, a correspondent of the Indian Museum.

In Malacca, and possibly extending up into Tenasserim, is found a variety of this species* figured by Doubleday in the Gen. D. L. (plate xiii, fig. i) as *H. lynceus* var. *idea*; it is smaller than the typical specimens, of equally grey ground-colour, the wings narrower and more elongated, and all the markings smaller, and with no tendency to confluence at the apex of the forewing. Expanse, 5·6 inches.

2. Hestia malabarica, Moore.

H. malabarica, Moore, Ann. and Mag. Nat. Hist., fourth series, vol. xx, p. 46 (1877).

HABITAT: South Concan, Malabar, South India.

EXPANSE: 5 to 5·5 inches *(Moore)*; 4·3 to 5·0 inches *(Marshall)*.

DESCRIPTION: "Allied to *H. belia*"* [from Java] "but differs on the *forewing* in the costa being black-streaked, the cell-spot more compact, there being also a contiguous but distinct spot situated outside the cell nearer the base, and between the costal and subcostal nervures; the discal series of spots turns to the costa more abruptly and nearer to the end of the cell; these spots are more conical, and have no contiguous patches on the veins. The marginal series of vein-marks are on long peduncles. On the *hindwing* the spots are somewhat smaller. *Abdomen* above with a broad dorsal black band." *(Moore*, l.c.) The FEMALE differs from the male in being rather larger, the *forewing* less emarginate outwardly, broader and more rounded; the *hindwing* is also rounder. All the markings are larger and a deeper black, and the ground-colour not quite such a pure clear white. As the markings of this species are precisely similar in every detail to those of *H. lynceus*, there is no occasion to repeat them.

"'Found in woody places on the western coast, especially on the thick-wooded mountain passes up the western Ghâts and Nilgiris.'" *(Moore*, l.c.) The *Hestia* found in the northern portions of the western Ghâts in the south Concan, and on the Goanese frontier, is much smaller than the dimensions given by Moore. Of nine specimens captured by Mr. G. Vidal, none reached 5 inches in expanse, and the smallest was only 4·3 inches; but there can be no doubt that they belong to the species described by Moore. Whether or not it is distinct from *H. lynceus* appears still open to doubt; but if the two species are distinct, the name *H. malabarica* would apply to the smaller northern race. It appears to be common towards the end of March on the wooded passes in the south Concan; a number of them were found on the Onomed and Coessi passes at about 1,600 to 1,700 feet above the sea, in that month.

Another species of this group, *Hestia linteata*,† Butler, has been recorded from Malacca.

* *Hestia belia*, Westwood, Cab. Or. Ent., p. 75, pl. xxxvii, fig. 2 (1848). *Habitat:* Java. *Expanse:* 5·5 inches *Description:* "Wings oval, snow-white, with the veins and spots black; the rather small spot of the discoidal cell scarcely extending into the subcostal area, and with a row of black oval spots beyond the middle of the wings, parallel with the apical margin, which is alternately marked with oblong-oval spots between the nervules, and clavate ones placed on the nervules; the inner false vein in the discoidal cell of the *hindwing* is marked in the middle of its outer edge with a black spot; the apical margin of the wings is rather irregular." *(Westwood*, l. c.)

H. belia differs from all the Indian species by the purer and more opaque ground-colour of the wings, the more rounded outline, the neatly, sharply-defined and rounded character of the spots, and lastly by the discal series on the *forewing* being parallel to the outer margin throughout its length, giving a neater and more regular appearance to the style of the markings. The chrysalis is suspended freely by the tail from the back of a leaf as figured in Horsfield and Moore's Cat. Lep. E. I. C., vol. i, pl. iv, fig. 12 (1857).

† *Hestia linteata*, Butler, Trans. Linn. Soc. Lond., second series, vol. i, Zoology, p. 536, pl. lxix, fig. 6. *Habitat:* Malacca. *Expanse:* 5·5 to 6·7 inches. *Description:* "Nearly allied to *H. belia*, Westwood, but much larger, the veins less broadly black-bordered; spots larger, excepting towards the costa of the *forewing* at apex; discoidal spot of *hindwing* very large; clavate markings terminating the nervules much longer, more slender in the middle." *(Butler*, l. c.)

This species seems to be the Continental representative of *H. belia*, which as yet has only been recorded from Java.

3. Hestia jasonia, Westwood. (PLATE III, FIG. 1 ♂).

H. jasonia, Westwood, Cab. Or. Ent., p. 87, pl. xlii, fig. 1, (1848), *male*; Butler, Trans. Ent. Soc. Lond., third series, vol. v, p. 470 (1867); *Nectaria jasonia*, Moore, Lep. Cey., p. 3, pl. i, fig. 1 (1880).

HABITAT: Ceylon.

EXPANSE: 4·75 to 6 inches.

DESCRIPTION: "MALE and FEMALE.—*Wings* semi-hyaline, fuliginous-white; nervures black. UPPERSIDE.—*Forewing* with a black basal costal border, an oblique irregular broad band across the middle of the cell, a short streak on the middle of the costa, a streak through the disco-cellular nervules, a large spot between the base of the two lower median nervules, a crutch-shaped mark extending to the base above the submedian nervure, a discal series of seven angulated-oval spots, a submarginal series of duplex spots terminating in a thickened streak at the end of each nervule, and a marginal row of spots. *Hindwing* with a black, round spot in the middle of the cell, two small spots below it, a discal series of eight angulated-oval spots, two of which are between the costal and subcostal nervures, a submarginal series of duplex spots terminating in a thickened streak at end of each nervule, and a marginal row of spots. *Head* and *thorax* spotted with white; thorax above, palpi and femora beneath, streaked with white. *Abdomen* black above, white beneath. UNDERSIDE of both fore and hindwings marked as above. Some specimens are darker coloured than that above described, being blackish fuliginous; others, again, have a slight ferruginous tint pervading the wings." (*Moore*, l. c.)

Horsfield and Moore, in the Catalogue of the Lepidoptera in the India Museum, p. 135 (1857), record a specimen of this species from Canara (south India), but all the *Hestias* we have yet seen from peninsular India belong either to *H. lynceus* or to *H. malabarica*, and with the solitary exception noted above the present species appears to be confined to Ceylon. A variety, also from Ceylon, has been discriminated by Butler, as having "the wings smaller, fuscescent, especially towards the apex, with the spots more approximating to the external margin." "*Hestia jasonia* affects the glades of woods, and is notable for its graceful flight, rising and descending almost like a gossamer in the air, and well deserving the name of 'the Sylph' which is commonly given to it." (*Dr. Thwaites*). "It is found only in the deep shade of the damp forest, usually frequenting the vicinity of pools of water and cascades, about which it sails heedless of the spray, the moisture of which may even be beneficial in preserving the elasticity of its thin and delicate wings that bend and undulate in the act of flight." (*Tennent.*) "In the forests, and especially about waterfalls in the western, central, and southern provinces, this Butterfly may be found all the year. It has a very slow floating flight, often poising nearly motionless, and is very easily caught." (*Hutchison*).

The plate is taken from a male specimen from Ceylon, in the Indian Museum, Calcutta; the upperside only is shown; the underside is similar to the upper. In the FEMALE the wings are broader in proportion to their length, but the markings are similar.

4. Hestia agamarschana,* Felder.

H. agamarschana, Felder, Reise Nov., Lep., p. 351, pl. xliii, fig. 7 (1867); Wood-Mason and de Nicéville, Journ, A. S. B. vol. l, pl. ii, p. 244, (1881); *H. jasonia*, var. a, Kirby, Syn. Cat. D. L., p. 2, n. 9 (1871).

HABITAT: Andaman islands, Mergui.

EXPANSE: 4·6 to 5·1 inches.

DESCRIPTION: "MALE.—*Wings* pellucid white, with the nervures black, the cellular folds, coniform spots on the nervures along the margin, with two confluent spots above and oval ones between, an interrupted costal band on the *forewing*, a large confluent spot in the cell, three large spots below the cell, a small subapical band, a disco-cellular series of spots elongated and confluent towards the costa forming an irregular black band, and the internal margin, also on the *hindwing* the cellular spot and eight other round ones besides the marginal series, dusky black; on the UNDERSIDE the spots are paler and smaller." (*Felder*, l. c.)

* "? 'Agamarsena' from ἄγαμος 'unmarried,' and ἄρσην, ἄρσενος 'male,' in allusion to the fact that the describer was ignorant of the opposite (female) sex."

According to Dr. Felder's figure the markings on this species are very similar in style to those of the south Indian *Hestias*, but far more boldly developed. The discal series of spots are much elongated towards the costa, where they are almost completely confluent, forming a wide subapical black band. It has been considered by some authors as a small local variety of *H. jasonia*, but "it obviously differs from *H. jasonia*, Westwood, by the wings being shorter in the inner and longer in the outer margin, by the more concave outer margin of the forewing, and by the longer and narrower discoidal cells." (*Felder*, l. c.). It is further distinguished from that and from all the other Continental types by the conspicuous subapical black band, and the wide black inner margin to the forewing. Quite recently (December, 1881, and January, 1882) three males and a female, which evidently belong to this species, have been taken for the Indian Museum in the Mergui archipelago; these differ from the type in being a little larger, and in having the black spot near the middle of the streak in the interno-median area of the hindwing. The FEMALE differs from the male in the *forewing* being wider and less emarginate externally; and in all the black markings of both wings being smaller, leaving a greater extent of the pure white ground-colour. See remarks on the following species, *H. cadelli*.

5. **Hestia cadelli**, W.-M. & de N. (PLATE IV, FIG. 2 ♂).

Hestia cadelli, Wood-Mason and de Nicéville, Journ. A. S. B., vol. xlix, part ii, p. 225, pl. xiii, fig. 1 (1880), *male*; Id., vol. l, part ii, p. 244 (1881), *female*.

HABITAT: Port Blair, South Andamans.

EXPANSE: 5 inches; length of forewing, 2·45 inches.

DESCRIPTION: "MALE: Allied to *H. agamarschana*, Felder. *Wings* above pure subpellucid white, clouded, especially on the outer halves, with minute black scales, and marked and veined with intense black; all the markings larger, more or less coalescent, and blurred or paler at the margins; the nervures more broadly black-bordered, and the marginal spots completely run together, so that the wings are all, especially the hindwings, distinctly bordered externally with black. *Forewing* relatively narrower and longer, being more than twice as long as broad, with the discoidal cell equal in length to the submedian nervure, that is to say, to the inner margin, and all but as long as the outer margin measured in a straight line from the extremity of the submedian nervure to that of the subcostal; with the anterior discal spots more elongated and more completely coalesced, the spot between the first and second median nervules alone constantly free, and the large rounded one internal to it in the same interspace coalescent with the enlarged extremity of the cellular mark (which fills the cell nearly to the level of the origin of the second median nervule, and is divided at the base of the wing by three indistinct longitudinal clouded white streaks), and the large mark in front of the submedian nervure larger, triangular, and united by a black streak to the discal black spot beyond it. *Hindwing* shorter and broader, with the outer margin more broadly rounded off, the cell and the interspaces beyond it broader, the spot in it larger, and all those around it free, though exhibiting a tendency to coalesce with the black margins of the nervules. UNDERSIDE dirty-white, of a dull opalescent tinge, with fuscous-black markings and nervures. FEMALE: Both wings broader, with the markings of the same shape, situation, size, and shade as in the male, from which, in fact, the female differs in the proportions of the organs of flight just in the same manner as does *H. hadeni*, ♀ from *H. cadelli*, ♂" (*vide* Pl. IV).

In describing this species Professor Wood-Mason and Mr. de Nicéville recorded the following note: "This specimen does not agree with Felder's figure and description of *H. agamarschana*, the only species of the genus hitherto recorded from these islands, either in the extent and relations of the black markings or in the shape and proportions of the wings; the former being larger, more or less coalescent generally, and completely run together at the outer margin so as to form a distinct black border to each wing, the hindwing being broadly rounded off at the extremity, and consequently not presenting the peculiar egg-shaped outline so characteristic of these organs in all the hitherto described Indian *Hestias*, *e.g.*, *H. lynceus*, *H. jasonia*, &c., with the latter of which Felder compares his species; the specimen apparently also differs from *H. agamarschana* in having the white of both wings everywhere more or less clouded

with minute black scales. *H. agamarschana*, it is true, to judge from Felder's figure of it, has the hindwing a little less pointed, the anterior discal spots on the forewing obviously more elongated, with more black in the cell and behind it, and the markings generally larger than in *H. jasonia*, and it is, as might have been expected, more closely related to the present specimen than to any other species; but, large series of specimens having shown us how extremely constant the different species or local races of *Hestia* are, we cannot unite the two, and we think that the differences they present are in all probability due to a difference of station, and that Helfer may have obtained the specimen that formed the type of Felder's species on a different island. All the Lepidoptera received of late years from the Andamans have been obtained in the immediate vicinity of the settlement at Port Blair, in an area therefore which is a very small fractional part indeed of the Andaman group of Islands, which extends through nearly four degrees of latitude. * * * The specimens of *Hestia* which Hewitson, in his list of Butterflies from the Andamans (Ann. and Mag. Nat. Hist., fourth series, vol. xiv, 1874, p. 356) considers to be specimens of *H. agamarschana* remarkable for their dark colour, doubtless belong to the species now described."

The type specimen, which was obtained by Colonel T. Cadell, V.C., is in the Indian Museum, Calcutta. Another specimen, taken subsequently by Mr. A. R. de Roëpstorff, also in the vicinity of Port Blair, on the 16th April, is in Major Marshall's collection. There are also a large series of both sexes of this species, collected by Mr. de Roëpstorff in the Indian Museum; they shew no variation whatever from the type, except in one or two specimens having an additional spot on the black streak in the interno-median area of the hindwing. The plate shews the upperside only of a male specimen in the Indian Museum, Calcutta.

6. **Hestia hadeni**, W.-M. & de N. (PLATE IV, FIG. 3 ♀).

H. hadeni, Wood-Mason and de Nicéville, Journ. A. S. B., vol. xlix, part ii, p. 242, pl. xiii, fig. 2, (1880), *female*.

HABITAT: Bassein, British Burma.

EXPANSE: 5·18 inches; length of forewing, 2·54.

DESCRIPTION: "FEMALE: Closely allied to *H. cadelli*. *Wings*, above pure fleckless white, marked and veined with black of a fuscous tint, with the marginal, submarginal, and all but the two posterior (which are subcoalescent with the marginal band) of the discal series of spots in the forewing, but with the marginal and submarginal series only in the hindwing completely run together, so that only the inner portions of the outlines of the innermost series of the coalesced spots are in either case still discernible, and so as to form a very broad outer border of black to both the wings. *Forewing*, broader and shorter, being less than twice as long as broad, the extreme length of the cell bearing the same relation to the submedian nervure and to the less deeply emarginate outer margin; with the spot at the base of the second median nervule smaller and free of the nervules, as also is the discoidal cellular spot at its posterior extremity; the curved club-shaped mark in the interno-median area much as in *H. agamarschana*, but not connected by a black streak with the subcoalescent marginal spot beyond it; the outer black border with a clouded white spot in the first median interspace more or less distinctly separating the second discal black spot off from the band; and the black inner marginal space longitudinally streaked with clouded white. *Hindwing* broader, with its undulated outer margin still more broadly rounded; the spot in the discoidal cell smaller, and the spots around it also rather smaller and free of the black outer border, though exhibiting a tendency to coalesce with it in front of the second median nervule. UNDERSIDE of a less pure white than above, marked and veined with fuscous. *Thorax* more conspicuously marked with greyish-white than in *H. cadelli*, in which these marks are almost effaced, but this character, as also the differences in the proportions, and the less obvious emargination of the outer margin of the wings, may be sexual." The MALE is as yet unknown.

Two specimens, both females, agreeing in every respect with one another, were obtained by Mr. Algernon Haden at Bassein; no other instance of its capture is on record. The type specimen is in the Indian Museum at Calcutta; the figure of it shews the upperside only. For the use of this well-executed plate, on which the two preceding species are represented, we

are indebted to Mr. J. Wood-Mason, Natural History Secretary of the Asiatic Society of Bengal, in whose Journal it first appeared.

Genus 2.—IDEOPSIS, Horsfield. (PLATE V).

Ideopsis, Horsfield and Moore, Cat. Lep. E. I. C., vol. i, p. 133 (1857); *Danais*, sect. 4, Doubl., Gen. D. L., p. 90 (1847.)

"Closely resembles *Hestia* in form, colouring, and texture of the wings, and to which it has another resemblance in the absence of the sexual spot on the *hindwing*. Like some species of *Danais*, and like the genus *Hestia*, it has the first subcostal nervule anastomosing with the costal nervure. Like most species of *Hestia*, the genus *Ideopsis* has the wings somewhat diaphanous, white; the outer margin, nervures, nervules, two or more vittæ in the cell, and a series of dots between the nervules, sometimes coalescing, all fuscous; but notwithstanding these points of resemblance, it may always be known from *Hestia* at first sight by its distinctly clavate antennæ, and on closer examination by its claws devoid of paronychia and pulvilli." (*Doubleday*, l. c.)

The Butterflies belonging to this genus were for a long time included under *Danais*, and form section iv of that genus in Westwood's Genera of Diurnal Lepidoptera. They are a fairly well-marked group, and are distinguished from all species of *Danais* by the *Hestia*-like style of their markings and colouring, and from all except the first group *Radena* by the absence in the males of the sexual spot or pouch on the hindwing. Six species are known, all from the Indo-Malayan region, only one species extending into the Indian limits in Tenasserim; the same species occurs also in China, the other five are insular and local.

7. Ideopsis daos, Boisduval. (PLATE V, FIG. 4 ♂).

Idea daos, Boisd., Sp. Gen., vol. i, pl. xxiv, fig. 3 (1836); *Hestia endora*, Gray, Lep. Ins. of Nepal, p. 10, pl. ix, fig. 3 (1846); *Idea diardi*, Voll., Tijd. Ent., vol. iii, p. 44, pl. ii, fig. 4 (1860); *Hestia daos*, Doubl., List. Lep. Brit. Mus., pt. i, p. 52; *Ideopsis daos*, Horsfield and Moore, Cat. Lep. E. I. C., vol. i, p. 134 (1857).

HABITAT: Tenasserim, Malay Peninsula, China.

EXPANSE: 4·0 to 4·4 inches.

DESCRIPTION: MALE: Both wings white, thickly irrorated with grey scales, semi-transparent, markings black, and also the nervures, which are more or less broadly bordered with the same colour. A narrow black line extends round both wings; *cilia* very short, black, white at the interspaces. *Forewing* with the whole of the costa black, and containing a basal streak about one-third the length of the wing, and three spots gradually decreasing towards the apex and equidistant from each other, white. Three black streaks in the discoidal cell, the anterior one immediately behind the subcostal nervure; the other two in the middle of the cell, joined about midway and not quite reaching the base of the cell. A large irregularly shaped spot occupies the outer end of the cell and extends a little beyond it. A discal series of six spots parallel with the outer margin between the nervules, the apical three small and conical, the point inwards, the lower three larger and circular. A marginal series of large spots placed on the nervules, between each pair of which on the folds are a pair of small marginal spots. A streak between the median and submedian nervures. *Hindwing* with a large spot occupying the outer extremity of the cell, from which issue two streaks united towards the base of the cell and which they do not reach. A discal series of six oval spots, the third and sixth from the apex the smallest, placed between the nervules. A marginal series of spots on the nervules, and between them a series of more or less pear-shaped spots, their points resting on the margin. The submedian nervure is widely bordered with black; between it and the first median nervule is a black streak (Penang specimen). The FEMALE differs from the male in the wings being shorter and broader, and the *forewing* not being emarginate. The ground-colour is also pure diaphanous white, all the markings smaller and clearer. It has also an additional spot on the forewing between the discoidal nervules (Singapore specimen). UNDERSIDE in both sexes, as above.

The caterpillar and chrysalis of *Ideopsis daos* were discovered by Captain Hamilton on the Tenasserim coast; and are figured by Horsfield and Moore (Cat. Lep., E. I. C., vol. i, plate iv, figs. 11, 11 a). The CATERPILLAR is about two inches in length, furnished with four pairs of

long fleshy tentacula upwards of half an inch in length, the first pair on the second segment projected horizontally forward over the head, the other three on the third, fifth, and twelfth segments projected upwards and backwards. It is dark ringed between the segments, and has a row of six large oval red spots in the spiracular region on the fifth to tenth segments, both inclusive. The CHRYSALIS is 1·1 inch in length; it is simply suspended by the tail. In general outline it closely resembles the chrysalis of *Hestia belia*, but the tail is more pointed.

The figure is taken from a specimen from Penang in the Indian Museum, Calcutta; the upperside only is shown, the underside being similar in markings to the upperside.

Genus 3.—DANAIS, Latreille. (PLATES V to VII).

Danais, Latreille, Enc. Méth., vol. ix, p. 10 (1819); Boisd. and Lec. Lép. Am. Sept., p. 133 (1833); Doubl., Gen. D. L., p. 89 (1847); But'., Proc. Zool. Soc. Lond., 1866, pp. 43, 171, *Monograph*; *Danaida*, Latr., Hist. Nat. Crust. Ins., vol. xiv, p. 108 (1805); *Danaus*, Latr., Gen. Crust. Ins., vol. iv, p. 201 (1809).

"ANTENNÆ, about one-half the length of the body, gradually but distinctly clavate. FORELEGS, with the femora and tibiæ about equal in length; the tarsi shorter. *Tarsi* of the MALES sometimes obscurely two-jointed, the basal joint subcylindric, rather stoutest at the apex; the second joint about one-fourth the length of the first, more or less pointed; sometimes without any indication of joints, subcylindric, tapering towards the base and apex. *Tarsi* of the FEMALES four-jointed, the last joint often indistinct, all, except the last, with a stout spine on each side at the apex. MIDDLE and HINDLEGS with the tarsi very spiny; the claws long, slightly curved; the pulvilli and paronychia obsolete."

"CATERPILLAR.—Subcylindrical, tapering towards the head; furnished with a few long fleshy tentacula, not retractile, placed in pairs, usually on the third and last segments. They are mostly white, tinged with green or purple, marked with transverse bands or narrow rings of black, the space between them often marked with yellow dots. They feed chiefly on ASCLEPIADEÆ."

"CHRYSALIS.—Suspended by the tail, ovate, contracted about the middle; the abdomen very short. They are commonly of a beautiful transparent green, spotted with black, and banded and spotted with gold, sometimes altogether of the most brilliant golden colour." *(Westwood.)*

Danais is distinguished from *Euploea* by the want of paronychia and pulvilli, as well as by the style of the sexual mark in the males, when present. This genus comprises several well-marked groups, and has a very wide range; some species are to be found in the warm latitudes of every part of the globe. The perfect insects generally appear within fifteen days after the chrysalis form has been assumed. They are of slow flapping flight, but often sailing high in the air with their wings expanded; most of the species are numerous and abundant where found.

The Indian species of *Danais* come under the following groups:—

A. The males having the anterior tibiæ and tarsi covered with short scales and fringed with thinly scattered long hairs; colours fuscous, with whitish or hyaline markings.

a. Males with no scent-pouch on the hindwing.

I. RADENA, Moore.

b. Males with two scent-pouches on the hindwing, marked on the underside by dilatation of the *first median* nervule, and submedian nervure.

II. PARANTICA, Moore.

c. Males with two scent-pouches on the hindwing, marked on the underside by dilatation of the submedian and *internal* nervures.

III. CHITTIRA,* Moore.

d. Males with one scent-pouch between the first median nervule and submedian nervure protruding on the underside as a prominent sac.

IV. TIRUMALA, Moore.

B. The males having the anterior tibiæ and tarsi covered with long, hair-like, not appressed scales, colours tawny brown with black and white markings.

a. Males with one scent-pouch placed as in *Tirumala*, but with the sac not nearly so prominent.

V. SALATURA, Moore.

* This group contains two types, very distinct in form and style of markings; the first has the wings elongate narrow, and with the hyaline markings greatly predominating (type, *D. tytia*). This is probably the type separated as CADUGA by Moore, but we have been unable to obtain any diagnosis of *Caduga*, and therefore cannot assign the name with certainty; the second has the wings shorter and broader, and the hyaline markings much reduced and narrow. This latter is the true *Chittira* of Moore (type, *D. taprobana*).

First Group.—RADENA. "*Forewing* moderately long, triangular; first subcostal nervule emitted at about one-third before end of the cell, and anastomosed to the costal in the middle; second nervule emitted before end of the cell. *Hindwing* broad, somewhat triangular; costal margin long, nearly straight; abdominal margin long; costal nervure very convex from the base, and then extending straight along the edge of the margin; cell broad, long; subcostal and median nervules very wide apart. No scent-pouch in the male. *Antennæ* longer than in allied genera, and with a more gradually thickened and blunt club. *Larva (R. juventa)* with two pairs of fleshy filaments. Type, *R. similis*, Linnæus, from China." (*Moore*, Lep. Ceylon, p. 3, 1880).

Only three species of this group occur within Indian limits; another occurs in Siam (*D. persimilis*), and another in Java (*D. juventa*), and it is possible that these may one and all be merely fixed geographical varieties of the type *D. similis*. The absence of the sexual spot in the male is a very distinctive feature found in no other group of Indian *Danais*, and linking this group with the foregoing genera. In the absence of the sexual spot the males can be distinguished by the pointed tip of the tarsus of the imperfect foreleg, which in the females terminates in a brush; and by the narrower and less rounded wings.

Key to the Indian species of Radena.

A. *a*. Males with no scent-pouch on the hindwing; both wings blackish, with subhyaline markings.

*a*¹. The white streaks from the base narrow; no defined black border to the wings.

8. D. (*Radena*) VULGARIS, Burma.

*b*¹. The whitish spaces on the basal area greatly predominating, leaving a well-defined dark border beyond.

*a*². The cell in the hindwing with two broad black streaks.

9. D. (*Radena*) EXPROMPTA, Ceylon.
D. (*Radena*) PERSIMILIS, Siam.

*b*². The cell in the hindwing almost entirely hyaline.

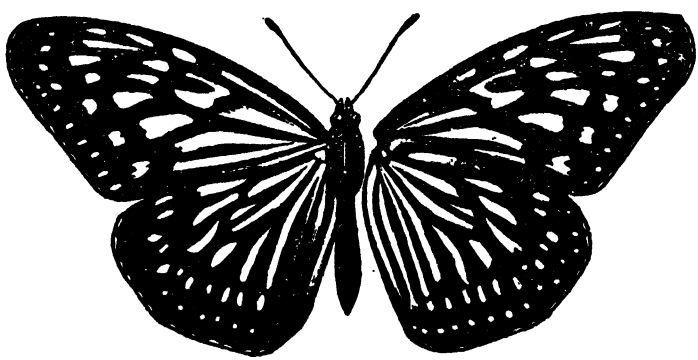
10. D. (*Radena*) NICOBARICA, Nicobars.

8. Danais vulgaris, Butler.

D. melissa, Doubleday (*nec* Cramer), List Lep. Brit. Mus., vol. i, p. 49 (1844); Gen. D. L., p. 92, n. 28 (1847); *D. vulgaris*, Butler, Ent. Month. Mag., vol. xi, p. 164 (1874); Moore, Proc. Zool. Soc. Lond., 1878, p. 822.

HABITAT: Burma, Mergui, Singapore, Borneo.

EXPANSE: 3·3 to 3·7 inches.



DESCRIPTION: "Allied to *D. similis*, altogether smaller, with all the spots paler and smaller, and all the streaks narrower; the second and third spots of the postcellular series smaller." (*Butler*, l.c.)

This is the original description, but in the absence of description or specimens of *D. similis*, which does not occur in India, and which has been but lately correctly discriminated, somewhat more is necessary to render it intelligible.

MALE. *Forewing* black; a streak in the discoidal cell from the base, followed by an irregular outwardly indented blotch near the end; a subcostal streak, followed by three decreasing subcostal spots, one between each pair of the nervules; an inwardly pointed streak above the first discoidal nervule; an oval spot touching the cell and an outwardly dentate spot some way beyond it between the first and second discoidal nervules; a similar pair of spots, but closer together between the second discoidal and third median nervules; a single large spot in each of the median interspaces near the base; two lengthened streaks starting from the base between the median and submedian nervures; a submarginal row of seven increasing spots, one between each pair of nervules, the apical one minute; an incomplete marginal row from the hinder angle of minute spots, two between each pair of nervules, and a short streak from the base below the submedian nervure—all subhyaline bluish-white. *Hindwing* brown, darker towards the apex; a spot at the base, a short streak above the costal nervure, and a longer one below it; two lengthened streaks in the cell joined at the base, with a short streak between them from the end; five streaks outside the cell, one in each interspace; two lengthened streaks from the base below the cell, (the inner one tinged ochreous), and one on each side of the internal nervure (also tinged ochreous); an irregular submarginal row of small elongate spots, coalescing with the streaks at the anal angle; and an incomplete marginal row of minute round spots evanescent at the apex—subhyaline bluish-white. UNDERSIDE: *Forewing* cupreous brown, blacker on the middle of the wing. *Hindwing* of a paler and uniform tint; all the subhyaline markings in both wings as on upperside.

Danais vulgaris is recorded by Butler from Nepal, Assam, Bengal, Moulmein, Singapore, Borneo, and Java; but if it really does occur anywhere west of Burma it is extremely rare. Limborg met with it at Ahsown, Moulmein to Meetan, and the Houngduran source in Upper Tenasserim; Mr. A. Haden has taken it at Bassein; Captain C. H. E. Adamson has taken specimens in the neighbourhood of Moulmein in March, June, October and December; Captain Bingham took it in the Thoungyeen forests in May. It is common at Rangoon; Dr. J. Anderson has taken it at Mergui in December; and there are two specimens in the Indian Museum, Calcutta—one from Malacca, the other from Borneo. It is apparently not uncommon in Upper Tenasserim throughout the year, and is probably frequently overlooked; but we know of no instance of its occurrence as yet even in Pegu or Arakan. The true *D. similis*, which is a native of Formosa and China, only really differs from *D. vulgaris* in being somewhat larger. The figure is taken from a male specimen from Malacca, in the Indian Museum, Calcutta, and shews the upper and underside.

9. **Danais exprompta**, Butler.

D. exprompta, Butler, Ent. Month. Mag., vol. xi, p. 164 (1874); *Radena exprompta*, Moore, Lep. Ceylon, p. 4, pl. ii, fig. 1 (1880), *Female*.

HABITAT: Ceylon.

EXPANSE: 3·25 inches *(Butler)*; 2·75 to 3 inches *(Moore)*.

DESCRIPTION: "Allied to *D. similis*, much smaller, the pale spots and streaks broader at base of wings, and in the series bounding the cell of *hindwing*; the second and third spots of the postcellular series in *forewing* considerably smaller; the long cuneiform spot of the outer discal series nearer to apical margin. UNDERSIDE, altogether paler and less coppery in tint." *(Butler*, l. c.)

The above is the original description; the following more detailed description is taken from Moore's "Lepidoptera of Ceylon":—

"MALE and FEMALE: UPPERSIDE blackish-brown; abdominal margin pale brown. *Forewing* with a pale blue narrow discoidal streak, and a large sinuous quadrate spot beyond it; a slender costal streak; two streaks below the cell, and a slender basal streak on inner margin; two large discal spots, three small upper spots, and five subapical spots, the upper three of which are slender; a submarginal regular series of seven small spots, and a marginal row of minute spots. *Hindwing* with pale blue, broad, basal streaks, large discal spots, an

irregular submarginal and marginal row of small spots. *Head*, *thorax*, and *palpi* white spotted. *Femora* beneath streaked with white. *Abdomen*, brown above, paler beneath. UNDERSIDE: *Forewing* dark brown; *hindwing* umber-brown; markings as above, but paler."

"Common in Kottawa forest, but have not seen it elsewhere." *(Wade)*. It appears to be confined to the island of Ceylon; no record of its occurrence elsewhere has been made.

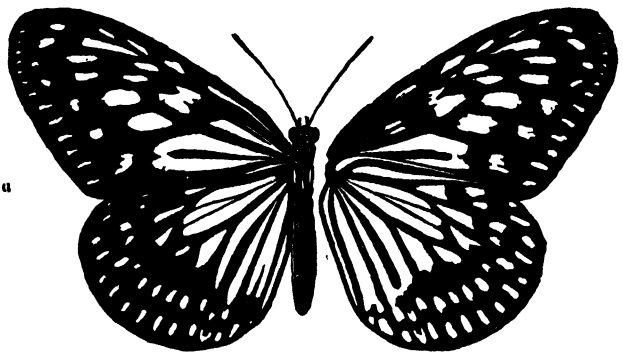
A closely allied species belonging to this group has lately been described from Siam under the name of *D. persimilis*.*

10. **Danais nicobarica**, W.-M. & de N.

D. similis, var. *nicobarica*, Wood-Mason and de Nicéville, Journ. A. S. B., vol. l, pt. ii, p. 225 (1881).

HABITAT: Great Nicobar.

EXPANSE: *Male*, 3·1 inches; *female*, 3·2 inches.



DESCRIPTION: "MALE and FEMALE: Nearest to *D. exprompta*, Butler, from Ceylon, from the figure† of which species (probably that of a female, though the sex is not stated) it differs, in the *forewing* in having the streak in the base of the interno-median area broader, occupying all but the entire breadth of the space, shorter, and marked along the middle by a linear streak (instead of being divided into two long and narrow streaks connected at the base only); and, in the *hindwing*, in having the cell entirely subdiaphanous greenish or bluish white, except for two excessively fine and faint longitudinal and apically-divergent dusky lines much as in *D. juventa* (instead of being divided by two very broad and black ones into two streaks, the posterior of which is strongly recurved at its free end); the discal series of bluish streaks immediately beyond the cell much narrower and shorter; and the ground-colour around them consequently of greater extent and giving to this portion of the wing a much darker appearance, again much as in *D. juventa*. The MALE differs from the female in the bluish markings of both wings being of a much deeper shade, and, with the exceptions to be stated, larger; in the *forewing* being narrower and externally slightly emarginate (instead of well rounded), with its outer submarginal series of spots reduced to small specks, and the three posterior ones of its inner series externally distinctly tridentate; and in the *hindwing* being also apparently somewhat narrower and less rounded externally, with both series of submarginal spots much smaller,—with its two posterior veins margined on both sides with fuscous of a far lighter and duller tint than the rest of the ground,—and with the submedian one of them more prominent, with the wing membrane on each side of it raised into a slight fold, and the two light streaks that bound it dirty whitey-brown: the male of this species is, in fact, provided with a distinct, though little-specialized, sexual mark or scent-gland."

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* *Danais persimilis*, Moore, Proc. Zool. Soc. Lond, 1879, p 136. HABITAT: Petchaburree, Bankok District, Siam (April 12th, 1875). EXPANSE: 2·37 inches DESCRIPTION: "Nearest allied to *D. exprompta*, Butler (the Ceylon form of *D. juventa*), but is much smaller in size. The markings are similar; but those from the base of the wings are very much more attenuated and shorter, and the discal spots also smaller, the markings on the *hindwing* being more attenuated than those in *D. grammica*." *(Moore*, l. c.). *D. agleoides* is probably referred to here.

† Moore, 'Lep Ceylon.' pl. ii, fig 2, 1880, *female*.

"One male and three females, the latter agreeing exactly with one another, from Great Nicobar." No notice of its occurrence elsewhere has been recorded. The figure shews the upper and underside of a female in the Indian Museum, Calcutta.

Second Group.—PARANTICA. "*Forewing* long, narrow; inner margin lengthened; first subcostal nervule emitted at one-fourth before end of the cell and touching the costal nervure near its end; the second emitted immediately before the end of the cell; cell long, narrow. *Hindwing* somewhat elongated; exterior margin very convex; abdominal margin short; costal nervure arched from base and thence extending along edge of the margin; cell very long and narrow. MALE with two spatular-shaped scent-pouches, one (the largest) being on the first median nervule, the other (about one-fourth its size) on the submedian nervure, near their end, each being visible on the underside by the slender swelling of these nervures at that part. *Antennæ* with lengthened slender tip. *Larva* with two pair of fleshy filaments. Type, *D. aglea*, Cramer." (*Moore*, 'Lep. Ceylon,' p. 7.)

This group is further divisible into two sections, the first of which has for its type *D. cleona*, Cramer; the Butterflies of this section comprise the smallest species of the genus, and are distinguished from all other species of *Danais* by having beautiful pure yellow tints on the hyaline markings of the wings; they are Malayan Butterflies, and within Indian limits are extremely rare. Four species are included in the Indian list, but the claims of two of them for inclusion rest on somewhat obscure data, especially those of *D. aspasia*, which is recorded from south India. The Butterflies of the second section, type *D. aglea*, are rather larger in size, and have no trace of the pure yellow tints; their head-quarters too are in Malayana, but they extend over the greater part of India, and some of the species are common where they occur. Of the five Indian species, one is found in Ceylon only; another, which is doubtfully distinct from the Ceylon species, occurs throughout peninsular India; another in north India extending into Burma; another in Burma extending to the Nicobars; and the last is confined to the Andaman Islands. They are all comparatively delicately-formed Butterflies, with rather elongate wings, and having the hyaline markings usually preponderating over the blackish ground-colour.

Key to the Indian species of Parantica.

A. *b*. Males with two scent-pouches on the hindwing, visible on the underside by dilatation of the *first median nervule* and submedian nervure. Wings blackish, with hyaline markings.

*a*¹. Of small size; some of the hyaline markings tinged with pure yellow.

*a*². With yellowish tints on both wings.

*a*³. With only one, or two, very small discal spots between the third and second median nervules.

11. D. *(Parantica)* CLEONA, N. India (?), Java.

*b*³. With two spots, the inner one filling the base of the interspace.

*a*⁴. Outer margin of forewing convex and scarcely emarginate; the streaks between the discoidal nervules short and broad.

12. D. *(Parantica)* PHILOMELA, Nepal (?), Java.

*b*⁴. Outer margin of forewing highly emarginate; the streaks between the discoidal nervules long and narrow.

13. D. *(Parantica)* CROCEA, Burma, Java.

*b*². With yellowish tints on hindwing only.

14. D. *(Parantica)* ASPASIA, Tranquebar (?).

*b*¹. Of rather larger size; no pure yellow tints.

*a*². Deep black, with pure hyaline white markings; hindwing with the black streaks very fine and white spaces wide.

15. D. *(Parantica)* MELANOLEUCA, Andamans.

*b*². Fuscous, with dull hyaline bluish-white markings.

*a*³. Forewing with the hyaline streak between the discoidal nervules almost touching the disco-cellular nervule.

16. D. *(Parantica)* AGLEA, N. India, Burma.

*b*³. Forewing with the streak between the discoidal nervules not nearly reaching the disco-cellular nervule

*a*⁴. Forewing lengthened and emarginate on outer margin hyaline markings large, prominent.

17. D. *(Parantica)* CEYLANICA, Ceylon.

18. D. *(Parantica)* GRAMMICA, S. India.

*b*⁴. Wings comparatively short and rounded; all the hyaline spots small, and the streaks narrow.

19. D. *(Parantica)* AGLEOIDES, Burma, Nicobars.

D. ceylanica is precisely similar to *D. grammica*, except that its tone of colouration is somewhat darker, and the hyaline markings are rather less prominent; they are very doubtfully distinct as species.

11. **Danais cleona**, Cramer.

Papilio cleona, Cramer, Pap. Ex, vol. iv, pl. cccIxxvii, fig. F (1781); Herbst, Pap., pl. cxxvi, fig. i (1793); *Danais cleona*, Godt., Enc. Méth., vol. ix, p. 190, n. 47 (1819); Blanc, Voy. au Pôle Sud, vol. iv, p. 386, pl. ii, fig 3 (1853); *Danais lutescens*, Butler, Proc. Zool. Soc. Lond., 1866, p. 172, n. 5, p. 173, fig. 3, *female*.

HABITAT: North India (apud *Westwood* and *Butler*), Java, Borneo.

EXPANSE: 3·0 to 3·5 inches.

DESCRIPTION: The following description is taken from Cramer's plate:—MALE: UPPERSIDE: *Forewing* black, with a short basal streak and beyond it an oval spot, both in the cell; three submarginal spots along the costa, below which are a short and broad streak below the subcostal nervure, a longer one between the discoidal nervules; a large spot above and a small one below the third median nervule; two spots below the second median nervule, the inner one large and completely filling the base of the interspace; and the space between the median and submedian nervules from the base to rather more than half the length of the wing—all hyaline tinted with pure yellow. A submarginal series of spots one between each pair of nervules, and a marginal row of smaller spots not reaching the apex, two between each pair of nervules—both series white. *Hindwing* also black; the entire discoidal cell, a series of spots round it between the nervules, a double streak joined at the base below the median nervure, a single streak below the submedian (and probably another near the abdominal margin) hyaline, tinted with pure yellow. A submarginal and marginal row of white spots as on forewing, except that in the hindwing there are two spots between each pair of nervules in both series. The usual black sexual marks. The FEMALE from Ceram and Borneo has been described by Butler as a separate species under the name of *D. lutescens*, and is stated to be "closely allied to *D. cleona* of Cramer, from which it differs chiefly in its pale colouring, more rounded and shorter wings, and larger spots." (*Butler*, l. c.). His figure agrees exactly with Cramer's, except in the outline of the wings being more rounded, and in the discoidal cell of the *forewing* being entirely hyaline. Blanchard's figure of a *female* (apparently) from Ceram in the "Voyage au Pôle Sud" shows a second very small spot inwardly between the third and second median nervules, which is absent from both Cramer's figure of a ♂, and Butler's of a ♀, thus showing an approach to *D. philomela* and *D. crocea*.

Atkinson (Ent. Month. Mag., vol. iv, p. 60, 1867) records having taken *D. cleona* at Jounpur, North-Western Provinces, in July. This record at any rate goes to prove that at least one species of this group of *Danais* still occurs in Continental India, but as far as we know there is no specimen of *D. cleona* now in any collection in this country.

12. **Danais philomela**, Zinken-Sommer.

Euplæa philomela, Zinken-Sommer, Nova Acta Ac. Nat. Cur., vol. xv, p. 184, pl. xvi, fig. 17 (1831).

HABITAT: Nepal (apud *Butler* and *Kirby*), Java.

EXPANSE: ♂, 2·5; ♀, 2·9 inches.

DESCRIPTION: MALE: UPPERSIDE: *Forewing* black: with the discoidal cell; two spots between the third and second median nervules; two larger spots between the second and first, the inner one of each pair entirely filling the base of the interspace; the entire space between the median nervure, first median nervule and the submedian nervure to within a fourth of the length of the wing from the outer margin—pure hyaline yellow. Three subcostal oval spots, one between each pair of the subcostal nervules; two streaks below these, the lower the longest; an outwardly indented spot between the second discoidal and third median nervules; a submarginal series of increasing spots, one between each pair of nervules; a very incomplete series of smaller marginal spots, two between each pair of nervules—white. The discoidal cell has near its middle a dusky streak, and the median nervure is widely bordered on both sides with black. *Hindwing* also black; with two small spots at the base; a very short streak above the costal nervure; a long one below it; the entire cell; a streak

below the first subcostal nervule ; a longer and broader one below this ; a spot between the discoidal and the third median nervules ; another between the third and second, with a small round spot beyond it ; a broad streak between the second and first, filling the base of the interspace, also with a small round spot beyond it ; two broad streaks connected at the base, between the median and submedian nervures ; a streak between the submedian and internal nervures—pure hyaline yellow. A small spot at the end of the streak below the costal nervure ; a spot beyond the streak between the first and second subcostal nervules ; an irregular submarginal row of small spots interrupted at the black sexual mark ; a regular marginal series ; both series with two spots between each pair of nervules—white. The streak between the internal nervure and the abdominal margin almost white, but faintly tinged with yellow. UNDERSIDE as above. Described from a Javan specimen in the Indian Museum, Calcutta. The figure of a FEMALE given in the "Nova Acta" differs from the male in the *forewing* being broader, rounder, and but slightly emarginate ; in having only the broad space below the median nervure tinged with yellow ; and the submarginal series of spots on the *hindwing* complete from the absence necessarily of the male sexual spot.

Butler writes (Proc. Zool. Soc. Lond., 1866, p. 456) :—"*Euplœa philomela* of Zinken-Sommer, hitherto placed as a synonym of *D. cleona* of Cramer, must be kept separate from it. This species, excepting in form, bears a more general appearance to my *D. crocea* ; it is intermediate between the two species ; and the male, two specimens of which I have discovered in the [British] Museum collection, is of the same form as my *D. gloriola*, ♂. It may be easily distinguished from *D. crocea*, not only by its different form, but by the male having the entire basal portion of the *forewing* yellow, and the subapical streaks much broader and shorter. HABITAT : Java, Nepal." It is included in the Indian list on the strength of the above quotation. If it does really occur in North India, it is rare ; it was not met with in Tenasserim either by Limborg or Captain Bingham.

13. **Danais crocea,** Butler. (PLATE V, FIG. 6 ♂).

D. crocea, Butler, Pro. Zool. Soc. Lond., 1866, p. 57, pl. iv, figs. 5, 6.

HABITAT : Nepal ?, Assam ?, Burma, Penang, Malacca, Singapur, Java, Borneo.

EXPANSE : ♂, 2·5 to 3·12 ; ♀, 2·62 to 3·19 inches.

DESCRIPTION : "Allied to *D. cleona*, Cramer, from which it differs in having the cell of *fore-* and the costa of *hindwings* unclouded ; the subapical and submarginal spots more numerous, and white, not yellow ; an additional yellow spot below the base of the third median nervule, the nervures not so broadly margined with brown, and the wings more transparent. UNDERSIDE the same as above. *Note.*—In some specimens the whole transparent portion of the *forewing* is clear white, with a slight tinge of yellow at the base." *(Butler,* l. c.)

"Occurs at Penang in August and September." *(W. L. Distant.)*

The figure is taken from a male specimen in the Indian Museum, Calcutta, from Kyouk Phyoo, Burma, and shows both upper and underside. This specimen differs from Butler's description as given above, in that the cell of the *forewing* is decidedly clouded, but it corresponds exactly with his figure No. 5—the real point of difference between this species and *D. cleona* being the absence, in the latter, or very minute size if present, of the inner spot between the second and third median nervules of the forewing. Dr. Anderson took two male specimens of this species at Mergui in December, and one in March.

14. **Danais aspasia,** Fabricius.

Papilio aspasius, Fabricius, Mant. Ins., vol. ii, p. 15, n. 145 (1787).

HABITAT : Tranquebar.

EXPANSE : (not given.)

DESCRIPTION : "Wings oblong, entire, black with hyaline streaks and spots. *Hindwing* yellow at the base ; *head* and *thorax* black, spotted with white ; *abdomen* fuscous. *Forewing*,

black, the base streaked and the apex spotted with hyaline. *Hindwing*, yellow at the base, with the veins black, the margin black, with hyaline spots."

The above is the original description by Fabricius; there does not appear to be any recent record of the occurrence of this species, but the description is sufficient to admit of identification if the Butterfly should again be found.

15. **Danais melanoleuca**, Moore.

D. melanoleuca, Moore, Pro. Zool. Soc. Lond., 1877, p. 581, pl. lviii, fig. 3.

HABITAT: South Andamans (Port Blair).

EXPANSE: ♂, 2·3 to 2·8; ♀, 2·6 to 3·3 inches.

DESCRIPTION: "MALE and FEMALE: Black. *Forewing*, with white space within the cell, two-thirds of space between first median nervule and submedian nervure; four discal spots, an indistinct costal basal streak, three costal spots before the apex, two lower elongated streaks, followed by a dentate spot, and three smaller rounded submarginal spots; some marginal white dots near the posterior angle, and a small spot below the apex, the space within the cell with short, narrow, dusky streaks from its end, and a median dusky line within the space below the median nervure. [In the numerous specimens in the Indian Museum, Calcutta, the submarginal spots are five to seven in number]. *Hindwing*, with white space within the cell and between the nervures to one-third from the outer margin, the upper spaces concave, and the lower conical externally; an indistinct dusky lunule crossing the end of the two lower median spaces, a prominent black bifid streak within the cell, and a line between first median nervule and submedian nervure; a submarginal series of small white spots, two between each pair of nervules (two being obsolete in the male on the sexual mark), and a marginal series of seven smaller spots from anal angle. *Head* and *thorax* with white spots and streaks. *Abdomen*, cinereous brown above, white beneath. *Femora* and *tibiæ*, white streaked." (*Moore*, l. c.) On the UNDERSIDE the markings are similar, but the marginal and submarginal series of spots are larger and complete on both wings. In the *forewing* the white space in the cell is sullied; and the two streaks beyond the cell and the spots below them are extended towards the submarginal spots, and very concave externally. In the *hindwing* the lower median white spaces, and the subcostal space are shortened, while the discal white spaces are lengthened, making the black border much more irregular in width than on the upperside.

D. melanoleuca is only as yet known from the Andamans, and is probably a local, insular, though very well marked, species, nearly allied to *D. vitrina*, Felder. It appears to be common at Port Blair, where it is on the wing throughout the year.

16. **Danais aglea**, Cramer. (PLATE VI, FIG. 7 ♂ ♀).

Papilio aglea, Cramer, Pap. Ex., vol. iv, pl. cccIxxvii, fig. E (1781), *male*; Herbst, Pap., pl. cxxv, fig. 5 (1793); *Danais similis*, Godart, Enc. Méth., vol. ix, p. 190, n. 46 (1819); *Danais aglea*, Moore, Pro. Zool. Soc. Lond, 1878, p. 822.

HABITAT: Sub-Himalayas, Assam, Burma, Tenasserim.

EXPANSE: 3·0 to 3·8 inches.

DESCRIPTION: MALE: *Forewing*, swarthy black; the discoidal cell, a narrow subcostal streak from the base nearly to the first subcostal branch, beyond this three decreasing spots between the subcostal branches, behind these spots a streak in front of the first discoidal nervule, and a longer one between the discoidal nervules; one spot above the third median nervule outwardly concave; two between the third and second, and two between the second and first, the inner of each of these pairs filling the base of the interspace; the entire space between the median and submedian nervures to within one-fourth of the length of the wing from the outer margin; a submarginal row of seven increasing spots, one between each pair of nervules; and a marginal row of two smaller spots between each pair of nervules disappearing towards

the apex—bluish subhyaline white; two dusky streaks from the end of the cell uniting towards the middle and not reaching the base, and a dusky streak in the middle of the hyaline space below the median nervure. *Hindwing* also swarthy black; the discoidal cell subhyaline, with a bifid blackish streak not reaching the base; two spots at the base; a streak above the costal nervure; an elongated streak below the costal nervure; five broad streaks round the end of the cell completely filling the interspaces at the base; the two in the median interspaces crossed near the end by a black bar not always complete; two broad streaks connected at the base, between the median and submedian nervures; and a single broad streak on each side of the internal nervure; a marginal and a submarginal row of spots two between each pair of nervules in each row—hyaline bluish-white. The submarginal row interrupted at the sexual mark. UNDERSIDE lighter, the bluish white markings similar but more prominent; none of the submarginal or marginal series of spots obsolete. The sexual spot on the first median nervule of the *hindwing* is deep intense black, and divided by a very narrow white streak on each side of the black nervule, which is slenderly dilated. The submedian nervure also is white and slenderly dilated in that portion adjoining the sexual spot. On the *forewing* the lower white streak between the discoidal nervules and the discal spot below it are extended in a crescent shape, half encircling the submarginal spots beyond. On the *hindwing* the white interspaces on either side of the discoidal nervule extend to and coalesce with the submarginal spots beyond, forming a prominent white patch on the border. FEMALE: Similar to the male, except that the wings are somewhat broader and the *forewing* less falcate. The sexual mark on the *hindwing* is of course absent, so the submarginal row of spots on that wing is complete and uninterrupted. *Cilia* black, spotted with white at the interspaces. *Head* and *thorax* spotted and streaked with white. *Abdomen* swarthy above, chalky white beneath.

D. aglea inhabits the region of heavy rainfall in north-east India, extending along the submontane tarais to the Sutlej, but common only towards the east. There is only one record of its occurrence so far west as Simla. A single specimen was taken by Mr. de Nicéville in a garden about 1,000 feet below Simla in July. Three specimens were taken in November 1880, at Naiashahr in the Saharanpore district by Mrs. Deane; and there is a specimen from Mussoorie in the Indian Museum, Calcutta, but in the north-west Himalayas it is decidedly a rare insect. In Kumaon there is no record as yet of its occurrence; in Sikkim it was taken in November by Mr. Otto Möller in the Great Runjit Valley at 1,200 to 3,500 feet elevation; and in the Darjeeling tarai and up to 6,000 feet elevation in the hills Mr. de Nicéville found it plentiful in October. In the Khasi hills it occurs in November; in Tenasserim Limborg took it in the winter at 3,000 to 6,000 feet elevation; and Captain C. T. Bingham found it there commonly in February up to 1,500 feet elevation, and again in August to November. Dr. J. Anderson took it at Mergui in December.

The figure shows the upperside of male and female from specimens from Sibsagar, Assam, in the Indian Museum, Calcutta.

17. **Danais ceylanica**, Felder.

D. ceylanica, Felder, Verh. zool.-bot. Gesellsch. Wien, vol. xii, p. 479, n. 90 (1862); *Parantica ceylonica*, Moore, Lep. Cey., p. 8, pl. ii, figs. 2, 2a, larva and pupa (1880).

HABITAT: Ceylon.

EXPANSE: 3 to 3·25 inches.

DESCRIPTION: "MALE and FEMALE. UPPERSIDE, dark fuliginous-brown. *Forewing* with a bluish-white narrow discoidal streak, above which are two parallel contiguous slender lines, two lengthened streaks below the cell, five discal spots, two upper slender streaks, and three costal spots, a submarginal row of small mostly cordate spots, and a marginal row of more or less indistinct smaller spots. *Hindwing* with broad bluish-white basal streaks, regular series of discal quadrate spots, the two lower of which have a contiguous or continuous outer spot, an irregular submarginal and marginal row of small spots. The two scent-pouches [as usual] in the male. *Head*, *thorax*, and *palpi*, white-spotted, a dorsal streak on the thorax, and the femora beneath, white. *Abdomen* brown above, white beneath. UNDERSIDE brown, markings clearer. *Forewing* with the discoidal streaks more distinct; above the cell is a

slender line, and the upper discal spot and the streak are concave externally. *Hindwing* with a black pouch area [as usual] in the male."

"LARVA, cylindrical, reddish-purple, two black fleshy filaments on third and two on twelfth segment; two dorsal rows of round chrome-yellow spots, and a lateral row of broken chrome-yellow spots, with intervening white dots on each segment. *Head* and *legs* black, white spotted. PUPA green, much constricted below the thorax, with blue and golden scattered dots and black raised dots on upper segments. Feeds on *Cryptolepis*, &c." (*Moore*, l. c.).

In his original short description of this species Felder remarks: "A local variety of *D. agleа* from north India intermediate between it and *D. agleoides*; the Ceylon form differs from both by its less sharply defined white markings, and from *D. agleoides* also by its much broader streaks." It appears that both Felder and also Moore in his more recent works must have overlooked *D. grammica*, which was figured by Boisduval so long ago as 1836. *D. ceylanica* is really a local form of *D. grammica*, which is the common south Indian species, and only differs from it by its generally darker colour, owing to the greater preponderance of the swarthy ground-colour; some specimens from Trevandrum are indistinguishable from *D. ceylanica*, although those from the Western Ghâts are notably paler as they extend northwards, and it is doubtful whether the name *ceylanica* should not be suppressed and the Ceylon species be included under the name *grammica*.

"Found everywhere all the year in open or partially cultivated places, but not often in forest. Flight slow and heavy. Perhaps the commonest Butterfly in Ceylon." (*Hutchison*).

18. **Danais grammica**, Boisduval.

D grammica, Boisd., Sp. Gén., Lép., vol. i, pl. xi, fig. 10 (1836).

HABITAT: South India.

EXPANSE: 2·7 to 3·4 inches.

DESCRIPTION: Boisduval's original figure, which unfortunately shows only the underside, and the costal margin of the forewing of the upperside, is the only authority for identifying this species, neither locality nor description being given. The figure corresponds exactly in markings with *D. ceylanica*, except that the outer of the three subcostal spots on the upperside of the forewing is wanting in *D. grammica*. The south Indian *Danais* of this type also corresponds in markings with *D. ceylanica*, but in a specimen from Belgaum the third subcostal spot is wanting, and the similarity with Boisduval's figure is complete. We have, therefore, even though this character is utterly inconstant, retained Boisduval's name for the south Indian species. The only points by which it can be distinguished from *D. ceylanica* are that it is slightly less black in general colouration, and on the upperside the marginal series of spots on the forewing is almost always complete to the apex in *D. grammica*, whereas in *D. ceylanica* it is seldom, if ever, complete; but if the localities were unknown it would be hardly possible to distinguish accurately between the species. There is little doubt that the Ceylon and south Indian species will eventually have to be united under the name *D. grammica*.

Moore records this species from Java and the Nicobars, and Butler records it from Moulmein, Malacca, and Java; but it is probable that *D. agleoides* is the species referred to in both cases, for out of the numerous collections we have received from Burma and the Nicobars, we have not found a single specimen approaching to *D. grammica*, while numerous specimens of *D. agleoides* have been sent. (*See* Journ. A. S. B., vol. l, part ii, p. 224, 1881).

D. grammica has been taken in Travancore by Messrs. Bourdillon and Fergusson; in August in the hills near Trevandrum; and in the Ashamboo range in May. In Calicut it has been taken in September; at Bangalore in August and November. A number of specimens were taken by Mr. G. Vidal, C.S., in the south Concan; on the Ghâts and on the Goanese frontier at 1,500 to 1,700 feet above the sea at the latter end of March; and in Belgaum it is common in October. A single specimen was also taken at Mahablêshwar at

Christmas by Mr. E. H. Aitken, and there is a specimen from Poona in the Indian Museum, Calcutta; but there is no record of its occurrence further north. This species is well distinguished from *D. aglea* so far as our present knowledge goes, and the geographical ranges of the two species seem to be widely separated; no species of this group occurs north of the Bombay Presidency, where *D. grammica* occurs, till *D. aglea* is met with in N. W. sub-Himalayas on the West. Our knowledge of the East Coast fauna is very limited at present, but as yet *D. aglea* has not been recorded from any place south of Assam in India proper, while *D. grammica* is not known to extend further north than Madras. If specimens should ultimately be found extending northwards along the East Coast, as is not improbable, it will be interesting to discover what approach, if any, they make to *D. aglea*.

19. **Danais agleoidēs**, Felder.

D. agleoides, Felder, Wien. Ent. Mon., vol. iv, p. 398, n. 17 (1860).

HABITAT: Burma, Malayana, Nicobars, Java.

EXPANSE: 2·7 to 3·2 inches.

DESCRIPTION: "MALE: Wings swarthy. *Forewing* with a costal streak and another internal one narrow, four wider discal ones, three costal spots, below the second of which a pair of elongated spots, then five in the disc and others external and marginal arranged in series, subhyaline; the apex above fuscous. *Hindwing* with seven streaks from the base, eight diversely formed discal streaks, and others placed irregularly in a double external row, subhyaline. Approximates very closely to *Danais aglea*, Cramer, but the wings are shorter and broader." (*Felder*, l. c.)

The above is a translation of Felder's short original description. The subhyaline markings on the upperside of the *forewing* are similar to those in *Danais aglea*, except being smaller, and the cell being divided along almost its whole length into three bluish-white streaks, which are joined at the base, the upper one being exceedingly narrow; and the interno-median area being occupied by two basally-joined streaks, the upper one much angled where the first median nervule is given off, the lower one straight. The *hindwing* has in the cell three hyaline streaks, the upper and lower ones joined at the base, the middle one short and lying outwardly between them. UNDERSIDE marked as above, but paler, wherein it differs much from *D. aglea*. As compared with *D. aglea*, *D. agleoides* is a much more compact and blacker insect, all the hyaline streaks being very narrow and the spots small. It is a very constant and well-marked species. The FEMALE only differs from the male in the absence of the sexual mark and the broader and more rounded outline of the wings.

It occurs commonly at Rangoon in January, July and September, and probably at other seasons also. On Nancowry Island, Nicobars, Mr. A. de Roepstörff took many specimens in August and September, and on Great Nicobar Island in October. It also occurs at Sambelong, Nicobars (*Moore*). Dr. J. Anderson took it very commonly in the Mergui archipelago in the cold weather. There is a specimen in the Indian Museum, Calcutta, labelled "Dukhun," "Sykes;" but the locality is probably erroneous, as *D. agleoides* appears to be confined to the east of the Bay of Bengal.

Third Group.—CHITTIRA: "Male with two scent-pouches, one spatular-shaped on the submedian nervure, accompanied by the dilated or swollen nervure, the other being the internal nervure dilated, but without any adjacent spatular patch." (*Moore*, Lep. Ceylon, p. 8). This includes two distinct types as regards style of markings and outline of the wings; the first group is represented by two species only in India, which are confined to the Himalayas, Assam and Burma; they have the wings elongate, especially the forewing, and the hyaline markings greatly predominating at the base of the wings; the second group also contains only two Indian species, one peculiar to Ceylon, and the other to the hills of south India; they have the wings comparatively short and broad, and the hyaline markings narrow and much reduced, the colours generally being far more opaque.

Key to the Indian species of Chittira.

A. c. Males with two scent-pouches on hindwing, marked by dilatation of the submedian and internal nervures. Colours black or brown, with hyaline markings.

a^1. Forewing, elongate; hyaline markings broad and extensive, occupying almost all the basal area of the wing. Of large size.

a^2. With the margin of hindwing broadly ferruginous.

20. D. TYTIA, Himalayas, Burma.

b^2. With the margin of hindwing broadly swarthy, always with whitish minute marginal spots.

21. D. MELANEUS, E. Himalayas, Burma.

b^1. "Forewing somewhat short and broad; costal margin much arched, inner margin long; hindwing broadly oval, very convex externally. Antennæ with a tolerably thick club." (*Chittira* as restricted by Moore). Hyaline markings reduced, narrow.

a^2. With white basal streaks on hindwing below the cell; and a brown streak in the whitish space on forewing below the cell.

22. D. (*Chittira*) NILGIRIENSIS, South India.

b^2. With no white basal streaks on hindwing below the cell; and with no brown streak in the whitish space below the cell in forewing.

23. D. (*Chittira*) TAPROBANA, Ceylon.

20. Danais tytia, Gray.

D. tytia, Gray, Lep. Ins. Nepal, p. 9, pl. ix, fig. 2 (1846); Doubl. Hew., Gen. D. L., pl. xii, fig 4 (1847); Moore, Pro. Zool. Soc. Lond., 1878, p. 822; *Danais sita*, Koll., Hüg. Kasch., vol. iv, p. 424, pl. vi (1848).

HABITAT: Himalayas, extending into Tenasserim.

EXPANSE: 3·5 to 4·4 inches.

DESCRIPTION: "*Forewing* black, with white semi-transparent spots between the nervures. *Hindwing* brownish-red, with the centre of the nervures near the base, and spots semi-transparent white, also a black spot at the anal angle." (*Gray*, l. c.) MALE: *Forewing* with the discoidal cell; three elongated decreasing spots along the costa; two streaks below these, the lower the longer; a spot below the end of the latter; two large spots between the second and third median nervules; two larger ones between the first and second, the inner one completely filling the angle made by the junction of the median nervure and first median nervule; the entire space between the median and submedian nervures to within one-fourth of the length of the wing from the outer margin; a narrow streak below the submedian nervure extending from the base half the length of the wing; a submarginal row of seven increasing spots, one between each pair of nervules; and an incomplete row of very small marginal spots not reaching the apex, two between each pair of nervules—hyaline bluish-white. *Hindwing* bright ferruginous; the disco-cellular and first and second median nervules black towards the margin; the discoidal cell hyaline, generally with a bifid streak within, not reaching the base; a small streak above the costal nervure at the base; an elongated streak below the costal; five spots around the end of the cell, one between each pair of nervules; two broad streaks connected at the base between the median and submedian nervures; and a single broad streak on either side of the internal nervure—hyaline bluish-white. A few submarginal bluish-white spots from the apex and faint traces of a marginal series. The usual sexual marks near the anal angle blackish. *Cilia* black, spotted with white at the interspaces. *Head* and *thorax* black, spotted with white. *Abdomen* ferruginous, streaked with white below. UNDERSIDE with the markings generally similar to the upperside; the apex of *forewing* ferruginous; the marginal series of spots complete to the apex; and also complete, large and conspicuous on the *hindwing*. FEMALE: Similar to the male, except that the marginal and submarginal rows of spots on the upperside of the *hindwing* are more apparent, and the sexual mark is absent.

D. tytia is one of the largest and most striking species of the genus, the wings are much elongated, and the forewing is somewhat falcate, especially in the male. It is found

throughout the Himalayas from Kashmir eastwards extending into Tenasserim; to the west it is comparatively rare, getting commoner towards the east. According to Col. Lang it is a forest-loving insect, frequenting in the Western Himalayas, wooded glens, at 6,000 to 7,000 feet altitude, with a high and soaring flight. In Kulu "it is not uncommon; it has four broods—the first brood appearing in April at the lower altitudes; the second brood appears in June at about 6,000 feet elevation; a third brood appears in August and the first week in September; and the fourth, which is much the smallest in numbers, appears late in October. It is strong on the wing and a high flier; the long pendant flowers of the hill *toon (Cedrela serrata)* are much affected by it." *(A. Graham Young).* Near Simla it appears to be rare. Mr. de Nicéville, who has carefully explored the surrounding hills himself, only found *D. tytia* on the wing once, in a wooded glen near Theog on the Hindustan and Thibet road; and though it is said actually to swarm in the Simla hills in some years, it has not done so to his knowledge since 1876. From Mussoorie specimens were brought by Herr von Hügel. In Kumaon, according to Mr. E. T. Atkinson, it is common about Naini Tal and Almorah from September to November. It has been reported also from Nepal and Bhutan. In Sikkim it is common; in the Khasi hills it is found in the autumn, and in the hilly districts of Burma it is common during the cold weather. It has also been found in Western Yunan.

21. **Danais melaneus,** Cramer. (PLATE V, FIG. 5 ♂ ♀).

Papilio melaneus, Cram., Pap. Ex, vol. i, pl. xxx, fig. D (1775); Herbst, Pap., pl. cxxiii, fig 5 (1793); *Hestia ephyre*, Hübner, Verz. bek. Schmett., p. 15, n. 74 (1816); *Danais melane*, Godart, Enc. Méth., vol. ix, p. 192, n. 53 (1819); *Danais melaneus*, Moore, Proc. Zool. Soc. Lond., 1878, p. 822.

HABITAT: The Eastern Himalayas, extending through Burma to Malayana and Java.

EXPANSE: 3·1 to 4·4 inches.

DESCRIPTION: *Forewing* marked spot for spot as in *D. tytia*, but differs from that species in being less elongate and falcate; the *hindwing* also is shorter and rounder. The ground-colour of the *hindwing* is swarthy instead of bright ferruginous, and the bifid streak in the cell, which is generally present in *D. tytia*, is never seen in this species; the marginal and submarginal series of small spots are, however, more distinct. The UNDERSIDE agrees exactly in markings with *D. tytia*, but the ground-colour of the *hindwing* differs in the same way as it does on the upperside.

D. melaneus is found in Sikkim, Sylhet, and the Khasi hills in November. In October also Mr. de Nicéville found it in profusion in the Sikhim tarai and as high as 6,000 feet in the Darjiling hills. In Tenasserim it was taken by Limborg in the cold weather at Ahsown, Moulmein, and Meetan. Captain Bingham took it in the Thoungyeen forests in the Tenasserim interior in the spring months; and it has been found in Penang, Malacca, and Java. It is apparently a forest-loving insect, similar in habits and in general appearance to *D. tytia*.

The figure is taken from specimens from Sibsagar in the Indian Museum, Calcutta, and shows the upperside of both sexes; the female on the left, and the male on the right.

22. **Danais nilgiriensis,** Moore. (PLATE VI, FIG. 9 ♂).

D. nilgiriensis, Moore, Ann. and Mag. Nat. Hist., fourth series, vol. xx, p. 44 (1877).

HABITAT: Conoor, Nilgiris; Ashamboo Hills.

EXPANSE: 3·0 to 3·8 inches.

DESCRIPTION: "Fuliginous black, with bluish-white markings. *Forewing*, with a bluish-white, black-streaked, stripe within the cell; three subapical costal spots, below which are two narrow streaks, the lower elongated; five spots within the disc; an elongated, black-centered, triangular streak between median and submedian nervures; a submarginal series of seven spots, the lower, second, and third with a dentate point outward; a short marginal row of small dots from posterior angle. *Hindwing*, with a bluish-white, narrow, fusiform streak

within the cell; five contiguous small narrow spots outside the cell; three long narrow abdominal streaks; a submarginal series of spots, the upper two largest, the third dentate, the others small; a marginal row of smaller spots. *Head*, *thorax*, and *legs* black, spotted and streaked with white. *Abdomen*, blackish above, grey beneath. UNDERSIDE paler, markings as above." (*Moore*, l.c.) In the above description Moore omits to mention the presence on the upperside of the *forewing* of a narrow streak from the base half along the length of the wing below the submedian nervure; and on the *hindwing* there are four abdominal streaks, two joined at the base, between the first median nervule and the submedian nervure, and one on either side of the internal nervure. On the UNDERSIDE the *forewing* is darker in the middle of the disc, the *hindwing* irrorated with grey, except a discal band beyond the cell from the costa to the anal angle which is brown, like the disc of the forewing. The FEMALE differs from the male in the absence in the *hindwing* of the sexual marks which are present in the male; the submarginal row of spots therefore consists of nine instead of six spots.

"Not common in the winter in Travancore; it occurs on the hills from 2,000 feet upwards; throughout February it is tolerably common. In April and May it was fairly common above 3,000 feet, and some specimens have been taken in June." (*Harold Fergusson*). Common at Conoor in July. It appears to be a local though very well-marked species, peculiar to the hills in the south of the peninsula.

The figure shows the upper and undersides of a male from Conoor in the Indian Museum, Calcutta.

23. **Danais taprobana**, Felder.

D taprobana, Felder, Reise Nov., Lep., vol. ii, p. 349, pl. xlii, fig. 4 (1865), *male*; *Danais fumata*, Butler, Proc Zool. Soc Lond., 1866, p. 53; *Chittira fumata*, Moore, Lep. Cey., p. 9, pl. iv, figs. 1, 1*a* (1880).

HABITAT: Ceylon.

EXPANSE: 2·75 to 3·8 inches.

DESCRIPTION: "UPPERSIDE: *Forewing* rich brown, with a long discoidal streak; a large patch below the median nervure, extending from the base to the middle of the first median branch; two spots between the first and second median branches, one in the middle, and one at the base of the nervules; three submarginal spots, one below each of the median branches, and often a fourth below the lower discoidal nervule; an oblique band from beyond the middle of the costa to the middle of the third median branch, divided into five spots by the nervules; one or two minute spots near the end of the cell, below the third median branch, and two small obliquely placed subapical spots in, and nearly completing the submarginal series—pale-greenish white, semi-transparent. *Hindwing* rich brown; interior margin paler; the cell, a short streak above near its termination, a minute streak near the costa beyond the middle (often wanting), a minute spot beyond the end of the cell, a submarginal row of three small spots near the apex, and an incomplete marginal row of four or five minute dots (generally absent in the male)—pale greenish white, semi-transparent. *Cilia* brown with whitish interspaces. *Body*, brown. UNDERSIDE: *Wings* golden brown, a patch of darker colour below the end of the cell in the *hindwing*, markings nearly as above, but the basal hyaline marks much suffused with brown; only one subapical spot on *forewing*; and in the *hindwing*, the marginal dots are larger and present in both sexes. BODY: *Thorax* black, spotted with yellow. *Abdomen* pale ochreous." (*Butler*, l. c.) The FEMALE differs from the male only in the absence of the sexual marks, and in the presence of the marginal dots on upperside of hindwing.

This exceedingly well-marked species seems confined to the Island of Ceylon. There is no record of its capture on the Indian Continent. In Ceylon, according to Hutchison, it is "found all the year round, scarce in February and March; in the hills at from 3,000 to 6,000 feet elevation; in forest and often in coffee plantations. Common at Newera Eliya, and several miles round. Flight slow and heavy."

Fourth Group :—TIRUMALA : "*Forewing* broad, triangular ; first branch of the subcostal nervure emitted at one-fifth before the end of the cell and free from the costal, the second emitted from the end of the cell. *Hindwing* broadly oval ; exterior margin very convex ; costal nervure slightly curved ; cell short, anteriorly oblique ; second subcostal branch starting from nearer the first, and third median branch nearer the second than in *Radena*. Male, with an open scent-pouch between the first median nervule and submedian nervure, the pendent sac of which is prominent on the underside. *Antennæ* shorter than in *Radena*, the club shorter and tip more pointed. *Larva* with two pair of fleshy filaments. Type, *D. limniacæ*, Cramer." (*Moore*, Lep. Ceylon, p. 4, 1880).

This group is represented by three species in the Indian region, and a fourth is included on somewhat doubtful grounds. They appear to be more variable in their markings than the species of other allied groups of *Danais*, so much so that specimens are often found which it is difficult to identify with certainty. Their colouration is a beautiful indigo black with subhyaline bluish-white spots and streaks ; all the species are of rather large size, and two of them are very common.

Key to the Indian species of Tirumala.

A. *d*. Males with one scent-pouch on hindwing, prominent on underside as a pendent sac. Colours blue black, with subhyaline markings

*a*². With two hyaline streaks from the base in the cell of forewing.

24. D. (*Tirumala*) GAUTAMA, Burma.

*b*². With only a single streak from the base in the cell of forewing.

*a*³. Hyaline markings large, prominent and very pale.

*a*⁴. Wings broad and short, marginal spots on hindwing brown, basal area of hindwing almost entirely hyaline, with no dark streak between median and submedian nervures.

25. D. (*Tirumala*) MELISSA, India (?), Java

*b*⁴. Wings somewhat elongate, no brown spots on hindwing ; marginal spots prominent ; the hyaline mark between median and submedian nervures of hindwing cleft outwardly by a dark streak.

26. D. (*Tirumala*) LIMNIACE. India.

*b*³. Hyaline markings small, dark, and distinct, with no tendency to coalesce.

27. D. (*Tirumala*) SEPTENTRIONIS, India

24. Danais gautama, Moore.

D. gautama, Moore, Ann. and Mag. Nat. Hist., fourth series, vol. xx, p. 43 (1877).

HABITAT : Arakan, Meplay Valley, Henzadah, Burma.

EXPANSE : 3·4 to 4·0 inches.

DESCRIPTION : "FEMALE : Black with bluish-white markings. *Forewing* with two long streaks within base of cell and three short streaks at its end ; a series of five narrow streaks beyond end of the cell ; six discal spots ; two lengthened narrow streaks starting from base between the median and submedian nervures, and a spot beyond, the upper streak broken near its end ; three small spots before the apex, and a marginal row of spots ; a short streak at base of hind margin. *Hindwing* with three streaks within the cell, an elongated discal series of streaks, and two outer marginal rows of small spots." (*Moore*. l. c.) The MALE differs only from the female in having the black sexual spot, which is situated between the first median nervule and submedian nervure, and is produced into a pouch below with the opening on the upperside. UNDERSIDE like the upperside, except that the apical region of the *forewing* and the whole of the *hindwing* is ochreous brown.

"Most nearly allied to *D. septentrionis*, Butler, but differs in the shape of the *forewing* (that of *D. gautama* being shorter), the two basal streaks within base of the cell, the wider interspaces between the discal and marginal spots, and in the form of the streaks below the cell. On the *hindwing* it has an additional streak within the cell, and the discal streaks between the veins are broad." (*Moore*, l. c.)

D. gautama, to judge from the recorded instances of its capture, seems to be very local. It has hitherto only been reported from a limited portion of British Burma. Captain C. T. Bingham took a single specimen in the Meplay Valley in February, and Captain C. H. E. Adamson has sent a single male specimen from Moulmein, where it was captured on the 12th June, and Dr. Anderson took it commonly in the Mergui Archipelago in December. It is probably not uncommon, but overlooked owing to its great superficial resemblance to the common *D. septentrionis*, though when once recognised it is a well-marked and easily distinguished species.

25. **Danais melissa**, Cramer.

Papilio melissa, Cramer, Pap. Ex., vol. iv, pl. cccIxxvii, figs. C, D (1781); Herbst, Pap., pl. cxxv, figs. 3, 4 (1793); *Danais melissa*, Godart, Enc. Méth., vol. ix, p. 192, n. 50 (1819).

HABITAT : (N. India?, Singapore?); Java.

EXPANSE : ♂, 3·0 to 3·5 inches.

DESCRIPTION : MALE : *Forewing* black; a narrow streak in the cell from the base, and an irregular spot beyond it; one subcostal spot beyond the end of the cell, immediately below which are three elongate spots between the nervules; a round spot touching the cell below the third median nervule; a larger, somewhat elongate, spot below the second; and a large spot above an elongate basal streak with a small separate rounded spot beyond them, below the third median nervule; a sinuate submarginal series of nine spots, the apical four, one between each pair of nervules, the next four in pairs in the median interspaces; and a marginal series of smaller spots—subhyaline bluish-white. *Hindwing* with the entire cell; a spot at the base of the wing; a slightly larger one above the costal nervure at its base; a streak below it with a spot beyond; a spot between the subcostal branches touching the cell; two streaks filling the base of the interspaces on either side of the discoidal nervule; two short narrow streaks joined at the base in each of the two median interspaces, the outer pair much the smaller; the whole space between the median and submedian nervures from the base to the sexual mark; and three lengthened abdominal streaks, the two below the submedian nervure joined at the base; a very irregular submarginal series of small somewhat elongate spots—subhyaline bluish-white. A marginal row, equally irregular, of very small spots, white at the apex and anal angle, those between them brown. UNDERSIDE : *Forewing* black; *hindwing* somewhat cupreous; the markings identical with those of the upperside, except that the marginal and submarginal spots are much more prominent, especially on the hindwing; both series are complete and all the spots are whitish with no brown tint. *Cilia* black, spotted with white. Described from Cramer's figures.

D. melissa is quoted by Westwood, Moore, and Butler as occurring in India, and on the strength of these authorities it is retained in the Indian list; but we have never seen a specimen taken in India, and we have great doubts as to whether it really does occur here. It is a Javan insect, and differs from the common *D. limniace* of India, which also occurs in Java, notably in having the basal area of the hindwing almost entirely hyaline leaving a prominent dark outer border,—in other words in *D. melissa* the hyaline spots on the outer half of the wing are reduced, and towards the margin evanescent, while those towards the base are enlarged greatly. Both these species vary much, and some specimens of the Indian *D. limniace* show an approach to *D. melissa* in the style of their markings, but none that we have seen could be separated from the Indian species or united with the Javan. The specimens of *D. melissa* from Java in the Indian Museum, Calcutta, differ from Cramer's figures on the forewing in having the three markings below the median nervure entirely coalescing, and on the hindwing in having a small dark streak in the cell, the hyaline streaks below it coalescing, making the abdominal area much paler, and the marginal spots bluish-white not brown, thus showing that this species is as liable to variation as is *D. limniace*.

26. Danais limniace, Cramer.

Papilio limniace, Cramer, Pap. Ex., vol. i, pl. lix, figs. D, E (1775); Herbst, Pap., pl. cxxiii, figs. 3, 4 (1793); *Danais leopardus*, Butler, Pro. Zool. Soc. Lond., 1866, p. 52, n. 36; *D. limniace*, G. Semper, Journ. des Mus. God., heft xiv, p. 139, pl. viii, fig. 6 (1879); *Tirumala limniacæ*, Moore, Lep. Cey., p. 4, pl. i, fig. 3 (1880).

HABITAT: Throughout the Indian region.

EXPANSE: 2·6 to 4·2; usually about 3·5 inches.

DESCRIPTION: MALE: *Forewing* deep blue-black; a streak from the base, with an outwardly indented spot beyond in the cell; two short subcostal streaks (the outer sometimes evanescent) just beyond the cell, with three streaks immediately below them, one between each pair of the nervules, the first narrow, the second and third broader, the third short and oval; a spot touching the cell below the third median nervule, a larger and longer spot below the second, and in the space between the first median nervule and submedian nervure are an elongate streak from the base, above it a shorter and broader streak, and beyond them a rounded spot—subhyaline bluish-white; these three latter markings are very variable. In some specimens all three are distinct; in others the two streaks coalesce; in others again the upper streak coalesces with the spot leaving the lower streak free; and, lastly, all three sometimes are almost completely confluent. A sinuous submarginal row of nine unequal-sized, rounded, rather prominent spots, and a marginal row of ten to twelve smaller spots—also hyaline bluish-white. *Hindwing* also deep blue-black, with a spot at the base, a short streak above the costal nervure, another with a rounded spot beyond it below the costal nervure; a small spot near the cell between the subcostal nervules, a wide streak on each side of the discoidal nervule touching the cell; two short streaks united at the base in each median interspace, the outer pair much the smaller; a similar pair, but much wider, between the median and submedian nervures from the base to the sexual mark; a similar, but much longer, pair below the submedian, and a lengthened abdominal streak—subhyaline bluish-white. The discoidal cell in some specimens is entirely subhyaline; in others there is a single black streak near the end, and in others again this streak is bifid and very prominent. An irregular prominent submarginal row of spots; all those above the second median nervule are rounded; those below it somewhat elongate; the rounded spots are in pairs between the nervules with the outer of each pair large and the inner small; a more regular marginal row of smaller spots also hyaline bluish-white. UNDERSIDE agrees in markings with the upperside, but on the apical area of the *forewing* and the whole of the *hindwing* the ground-colour is cupreous. The *head* and *thorax* are blue-black, spotted and streaked with white. *Abdomen* swarthy above, and fulvous, with whitish spots below. FEMALE: Differs only from the male in the pair of subhyaline streaks below the median nervure being lengthened across the space occupied in the male by the sexual organ, which latter is of course absent in the female.

"*Larva* yellowish-white or yellowish-green, with a pair of long fleshy filaments on third, and a short pair on twelfth segment; the filaments black and greenish-white, longitudinally lined with black points; each segment with transverse black bars, one on each, thicker, which bifurcates near the lateral line; a narrower bar at anterior edge, and two, also narrower, at posterior part of the segment; lateral band yellow; head and feet ringed with black. *Pupa* green, somewhat cylindrical, constricted below the thorax, with golden scattered dots and beaded ring. Feeds on *Asclepias*." (*Moore*, Lep. Ceylon, p. 5). Figured in Horsfield and Moore's Cat. Lep. E. I. C., pl. iv., figs. 3, 3a (1857).

The range of this species is very wide. It is found in the driest as well in the dampest localities, and extends into the Himalayas up to at least 6,000 feet. In Travancore, according to Mr. Harold Fergusson, it is common from the foot of the hills to the summits, most abundant in November and December, common throughout February, only a few seen in March, but again fairly common at the higher elevations in April and May. It is common throughout the Deccan, extending into Sind, and throughout the plains of north India it is on the wing nearly all the year round; and in the outer Himalayas from Kashmir to Nepal. In Kulu Mr. A. Graham Young writes that it is common in some years, rare in others, and occurs in May, August, and October. Mr. S. E. Peal has taken it at Sibsagar in Upper Assam. It is not uncommon in Rangoon, and in the Nicobar Islands. In Calcutta it is plentiful all through

the year, and to be met with everywhere, particularly in gardens, where it is almost the commonest insect seen. Like the rest of the genus it has a slow flapping flight, and settles frequently, often at the very end of a dead stick.

27. **Danais septentrionis**, Butler. (PLATE VI, FIG. 8 ♂ ♀).

Danais septentrionis, Butler, Ent. Month. Mag., vol. xi, p. 163 (1874); *D. septentrionis*, G. Semper, Journ. des Mus. God., heft xiv, p. 140, pl. viii, fig. 7 (1879); *Tirumala septentrionis*, Moore, Lep. Cey., p. 5, pl. i, fig. 2 (1880).

HABITAT: India.

EXPANSE: 3·4 to 4·4 inches.

DESCRIPTION: "Allied to *D. hamata*,* of McLeay, but constantly much larger. UPPERSIDE: *Forewing* with the spots on the disc smaller. *Hindwing* olive-brown (instead of chocolate-brown); the streaks beyond the cell, between the subcostal and radial nervures, narrower, longer, and not notched externally; the brown patch in the cell broader (frequently reaching to the radial nervure without a notch); submarginal spots more elongated. UNDERSIDE: *Forewing* paler than in *D. hamata*: *hindwing* more cupreous in tint." (*Butler*, l.c.)

D. septentrionis is the common dark form of blue *Danais* that has frequently passed as *D. similis*† in collections in this country. It differs from *D. limniace* in its usually larger size and in the deeper blue tone of the subhyaline markings, which are also smaller and more distinct throughout. On the *forewing* the streaks on either side of the lower discoidal nervule are narrow and pointed externally, the lower one always the shorter, whereas in *D. limniace* they are broad and truncate; the basal streak below the median nervure is short, narrow and widely separated from the spot above and the one beyond it, except in some specimens from S. India. On the *hindwing* the subhyaline markings in the cell are reduced to two streaks, with sometimes a minute spot between them at the outer end of the cell. On the UNDERSIDE the markings are similar to those of the upperside, and the cupreous tints of the fore and hindwings are much darker than in *D. limniace*.

This Butterfly seems to be less generally distributed than *D. limniace*. It has not been recorded from the Andamans or Nicobars, but is common in Tenasserim, in Assam, and in the Eastern Himalayas and tarais; it is rare in the Western Himalayas; and appears again in south India and Ceylon, but from the sub-Himalayan tracts on the north to Bangalore on the south we have as yet no record of its occurrence. The south Indian and Ceylon form is much smaller than that from north-east India. Specimens from south India (Bangalore, Kadur District, and Calicut) show an approximation to *D. limniace* in their much lighter general tone of colouration and the more or less complete coalescing of the spots and streaks behind the median nervure in the forewing; but the streaks on either side of the lower discoidal nervule are decidedly proportionally longer, narrower and externally more pointed, showing that these aberrant specimens really belong to the present species *D. septentrionis*. In the Simla district Mr. de Nicéville has taken it rather sparingly from August to October, and only in beds of streams with richly wooded sides; in one such locality near Kotgarh, elevation about 6,000 feet, it was fairly plentiful in August, 1879. Mr. A. Graham Young writes that "it very seldom occurs in Kulu, generally in July." In Chumba at 3,000 feet elevation there is a spring brood in April; and Mr. E. T. Atkinson, C.S., reports having found it common in the lower hills and plains below Kumaon; and Mr. F. Bourdillon has taken it in Travancore in May.

The figure shows the upperside of both male and female from specimens from Sibsagar in the Indian Museum, Calcutta.

Fifth Group.—SALATURA: "*Forewing* lengthened, triangular; costa slightly arched; apex more or less rounded; exterior margin waved, oblique, slightly convex in the middle;

* From Australia.

† See No. 8, *D. vulgaris*.

inner margin slightly recurved; costal nervure extending to two-thirds the length, first subcostal branch emitted before end of the cell, second at end of the cell, third and fourth at equal distances from its end; cell long; upper disco-cellular bent inwards, and angled at its upper and lower end, lower outwardly oblique; radials from angles of upper disco-cellular; median branches widely separated, submedian slightly recurved. *Hindwing* broadly oval; exterior margin rounded, slightly sinuous; costal nervure short, curved upward, and emitting a short basal spur; first subcostal emitted before end of the cell, and curving upward before the apex, second slightly bent at end of the cell; disco-cellulars very oblique, upper shortest and slightly concave, radial from their middle; second median branch near end of the cell; lower bent near its base, submedian nearly straight, internal recurved. MALE with an open scent-pouch between first median nervule and submedian nervure. Body long; palpi pilose; middle and hindlegs slender. *Larva* with three pairs of fleshy filaments. Type, *D. genutia*, Cramer." (*Moore*, Lep. Ceylon, p. 5, 1880).

This group includes all the species of what are known as "tawny" *Danais*, and is represented within Indian limits by eight species, some of which probably are insular or local, and may eventually prove to be merely geographical varieties; some of them are exceedingly common, and two of them are found everywhere throughout the country, often in immense numbers. The group has a very wide range, extending from Eastern Europe throughout Southern and Eastern Asia, to Australia; also to South Europe, North Africa and North America. Out of the eight species included as Indian, the claim of one, *D. plexippus*, to admission is extremely doubtful; it is included on the authority of Butler's identification.

Key to the Indian species of Salatura.

B. a. Males with a scent-pouch on hindwing, situated as in *Tirumala*, but with the sac not so prominent on underside. Wings opaque; prevailing colour tawny yellowish-brown, with black and white markings.

*a*¹. The nervures of the wings not defined with black; the outer margin of both wings black, with white spots.

*a*². Apex of forewing black with a white subapical macular band.

*a*³. Hindwing uniform tawny.

28. D. *(Salatura)* CHRYSIPPUS, India.

*b*³. Hindwing suffused with pure white.

29. D. *(Salatura)* ALCIPPUS, N. W. India, Rangoon.

*b*². Apex of forewing tawny, the white subapical band obsolete.

30. D. *(Salatura)* DORIPPUS, Sind.

*b*¹. The nervures more or less broadly defined with black.

*a*². Hindwing bright ferruginous.

*a*³. With white marginal and submarginal spots.

31. D. *(Salatura)* GENUTIA,* India.

*b*³. Without white marginal and submarginal spots.

32. D. *(Salatura)* NIPALENSIS, Nepal.

*b*². Hindwing dull dark ferruginous, with fine bifid white spots on the disc on underside; nervures of forewing only partially defined with black on upperside.

33. D. *(Salatura)* PHILENE, Punjab (?), Java.

*c*². Hindwing very dark brown with pure white streaks.

*a*³. With two oblique rows of white spots from costa of forewing; white streaks on hindwing large.

34. D. *(Salatura)* HEGESIPPUS, N. E. India, Orissa, Burma.

*b*³. With the inner row of white spots on forewing evanescent or wanting; white streaks on hindwing narrow.

35. D. *(Salatura)* NESIPPUS, Nicobars.

*d*². Hindwing dark brown with sullied white streaks.

36. D. *(Salatura)* MELANIPPUS, N. E. India.

* *D. genutia* is the name under which the Butterfly, commonly known as *D. plexippus*, must stand; see detailed description of this species.

28. Danais chrysippus, Linnæus. (PLATE VI, FIG. 10 ♂ ♀.)

Papilio chrysippus, Linnæus, Mus. Ulr., p. 263 (1764); Syst. Nat, vol. i, pt. ii, p. 767, n. 119 (1767); Cramer, Pap. Ex., vol. ii, pl. cxviii, figs. B, C (1777); *Papilio ægyptius*, Schreber, Nov. Sp. Ins., p. 9, figs. 11, 12 (1759); Herbst, Pap., pl. clv, figs. 1, 2 (1794); *Danais chrysippe*, Godt., Enc. Méth, vol. ix, p. 187, n. 38 (1819); *Danais chrysippus*, Horsfield and Moore, Cat. Lep. E. I. C., vol. i, pl. iv, fig. 7, caterpillar, 7a, chrysalis; *Salatura chrysippus*, Moore, Lep. Cey., p. 7, pl. iii, figs. 1, male; 1a, female; 1b, caterpillar and chrysalis (1880).

HABITAT: Throughout India and Burma up to 7,000 feet elevation.

EXPANSE: 2·25 to 3·4 inches.

DESCRIPTION: MALE and FEMALE. UPPERSIDE: *Forewing*, with the costa narrowly, the whole apical area, including a small portion of the extremity of the cell, and decreasingly to the inner angle fuscous black; the rest of the wing bright ferruginous, darker in the cell and sometimes a little below and beyond it. A small quadrate spot on the costa, about one-third the length of the wing from the base; a larger one beyond it; an oblique band of five spots from the costa to the third median nervule, divided by the black nervules; a small spot between the discoidal and third median nervules touching the cell, and sometimes a smaller one above it; a round spot, variable in size on the inner margin of the black apical area between the first and second median nervules; a submarginal and marginal series of small spots, the former always with two increasing spots at the apex, the series sometimes extending from the apex to the third median nervule, but generally with only the two spots below the macular band present, the upper one of the two always the largest, as are also the spots below them in the marginal series, white. In some specimens the apical area beyond the macular band is suffused between the veins with ferruginous. *Hindwing* bright ferruginous, narrowly bordered with a black band, irregular towards the apex, inwardly scalloped towards the anal angle. Three white spots at the apical angle; the upper disco-cellular nervule bordered with a black spot below the point where the second subcostal nervule is given off; another black spot where the discoidal nervure is given off; and a third filling the outer angle of the cell, where the third median nervule is given off. In some specimens the nervules on the disc are narrowly bordered with white. A marginal series of small somewhat squarish spots placed on the marginal black band, frequently evanescent towards the apex. The MALE has in addition a black sexual spot placed against the first median nervule, and extending into the space between it and the submedian nervure. UNDERSIDE: *Forewing* as above, except that the macular subapical band of white spots is only inwardly margined with black, the apical area from that band almost up to the marginal black band being ochreous. There is also an additional spot along the costa of the submarginal series. *Hindwing* ochreous, all the veins and the spots on the disco-cellular nervules more or less bordered with white; the sexual mark in the *male* centred with a white spot, the marginal black band inwardly irregularly defined with white, and the marginal white series of spots always complete, lunular and much larger than on the upperside.

D. chrysippus is the commonest and most widely spread of all the Indian Butterflies. It is found throughout Eastern and Southern Asia, and even extends into Europe and North Africa. No locality seems to be unsuited to it. Up to a level of 7,000 feet above the sea, it may be found anywhere in the Indian Empire, but perhaps the dry hot plains of Northern India are on the whole the most congenial to it. At all events there it is the most conspicuous as it is almost the one solitary species that can thrive in the dust and glare. It seems moreover to be as indifferent to season as it is to locality, and in the plains of north India at all events it is to be found throughout the year, though most abundant in the winter months. It is hardly necessary to quote localities or dates in this case, for wherever the temperature is high enough, *D. chrysippus* may be found throughout the year. It has however not been recorded from the Andaman isles, though it occurs at the Nicobars. Only in the hills does its appearance seem to be governed by season. Mr. de Nicéville has only met with it in the Simla district in the autumn. Mr. A. Graham Young, writing from Kulu, gives, with reference to this species, the following note which is of interest as relating to its occurrence out of India :—

"Common in Kulu; the first brood appears in June, then a succession of broods from August throughout the autumn. I found a great number of the larvæ of this insect whilst marching through the Sialkot District in May. They were on that species of *Euphorbium*, so common on sandy ground in the Punjab. I bred a lot, but all that I can now remember is that they emerge from the pupa on the average in about twelve days. I first saw this insect while travelling through South Persia many years ago. I met with a few at Khaneh Zeenon, 32 miles south of Shiraz, early in April, and at Dasht-i-arjun, a grassy plain surrounded by mountains a few miles further on, elevation nearly 6,000 feet, they were out on the banks of a small river in swarms during six hours that I halted there. I must have seen some thousands; they were all fresh from the chrysalis, and the surrounding herbage was covered with these pupæ, and with newly emerged insects."

The following description of the caterpillar and chrysalis of *D. chrysippus* is taken from a paper by Mrs. T. Vernon Wollaston in the Ann. and Mag. Nat. Hist., fifth series, vol. iii, p. 221 (1879).

"The caterpillar of this *Danais* is rather more than an inch and a half in length, and of a delicate French grey, each segment being ornamented with five black transverse lines, the second and third ones of which are somewhat broader, and enclose too large yellow transverse patches. There is a yellow spiracle-line very much interrupted, the skin being puckered, and the spiracles themselves scarcely visible. The head has three broad, transverse, arched, black lines, the anterior one of which encloses a yellow space, bordered in front by a straight basal line. The third, sixth, and last segments are each furnished with a pair of conspicuous dark retractile [?] horns, the anterior pair of which are almost twice the length of the others. When fully fed, it suspends itself by its tail, and turns into an obtuse semi-transparent chrysalis, beautifully marked with small golden spots, placed elliptically round the head, and with a black, raised, semi-circular line near the tail, the posterior edge of which is of a brilliant gold; there is also a minute golden spot about the position of the centre of the enclosed wings. These golden markings, however, disappear by the absorption of the fluids, as the enclosed insect approaches maturity."

The caterpillar feeds in India on *Calotropis gigantea* (Lang); *Asclepias curasavica* (Moore). The chrysalides in *Danais chrysippus* are dichroic, some being bright green, and others pale pinkish, wax-white, but Mr. Wood-Mason has ascertained that this difference in colour is not sexual, males and females being produced indifferently from green and pink chrysalides, and he considers that we here have to do with an instance of the same animal at the same stage of its development being protected by its resemblance to two different parts of the vegetable organism on which it feeds and resides, namely, the leaves and the blossoms, the green chrysalises matching green leaves, and the pink ones being of a colour likely to be mistaken by birds, reptiles, and predaceous insects for a blossom.

The figure, taken from a Calcutta specimen in the Indian Musuem, Calcutta, shows the upperside of a male on the left and female on the right.

29. **Danais alcippus**, Cramer.

Papilio alcippus, Cramer, Pap. Ex., vol. ii, pl. cxxvii, figs. E, F (1777); Fabricius, Ent. Syst, vol. iii, pt. i, p. 50, n. 155 (1793); Herbst, Pap., pl. clv, figs. 5, 6 (1794); *Euplæa alcippe*, Hübner, Verz. bek. Schmett., p. 15 (1816); Ochsenh, pl. iv, p. 120; *Danais alcippe*, Godart, Enc. Méth., vol. ix, p. 188, n. 39 (1819).

HABITAT: Plains of North-West India, and Rangoon.

EXPANSE: 2·9 to 3·5 inches.

DESCRIPTION: This species differs from *D. chrysippus* in the *hindwing* on both the upper and undersides being more or less, particularly in the middle of the wing, suffused with pure white. This character is very varied in different specimens, both in uniformity and extent; in some, it covers the whole of the middle of the wing: in others it is confined to the area below the cell only, and again in others, it is streaked and sullied with fulvous.

Its appearance is so erratic over a large extent of country that in distribution as well as in inconstancy of the extent of white, the idea of its being only a casual variety of *D. chrysippus* is suggested; but the variety, if such it should prove to be, is so well marked that it is worthy of retention as a distinct species, until the discovery of the caterpillar, which is as yet unknown, sets the question at rest.

D. alcippus is found occasionally throughout the plains of Northern India. According to Major C. Swinhoe it is scarce in Sind, appearing in November and December. Mr. de Nicéville took two specimens at Nurpur in the Punjab in May. In the N. W. Provinces it is still more scarce, the only place where it is known to have occurred being Lucknow, where two specimens were taken by Col. Lang; towards the East it is certainly nowhere common. There is a single specimen from Rangoon in the Indian Museum, Calcutta.

30. **Danais dorippus,** Klug.

Euplœa dorippus, Klug, Symb. Phys., pl. xlviii, figs. 1—5 (1845); *Danais chrysippus*, var. c, Kirby, Syst. Cat. D. L., p. 7 (1871); *D. dorippus*, Oberthür, Études d'Entom., 3 me, livr., p. 24, pl. i, fig 5, (1878) *male*, from Zanzibar.

HABITAT: Sind, extending to South-Eastern Europe and Africa.

EXPANSE: 2·3 to 3·6 inches.

DESCRIPTION: This species may at once be distinguished from *D. chrysippus* by the absence on the UPPERSIDE of the *forewing* of the black apical patch, and the white subapical band, the spot outside the cell and the one on the inner margin of the black apical patch between the first and second median nervules. The submarginal row of spots in *D. dorippus* is generally entirely wanting; if present at all it consists of two or three spots between the first and third median nervules. The marginal series is also very abbreviated, three spots at the apex, and a few between the first and third median nervules being generally alone present, though sometimes the series is nearly complete, but the spots are always smaller than in *D. chrysippus*. *Hindwing* as in *D. chrysippus*, except that the marginal series of white dots is almost obsolete. UNDERSIDE bright fulvous; deep ferruginous colour nearly filling the cell; light ochreous at the apex. Two spots, one on each side of the discoidal nervule, just beyond and touching the cell, a subapical oblique band of five spots from the costa to the third median nervule, divided by the veins, (these spots are faintly seen on the upperside through transparency)—white. Otherwise as in *D. chrysippus*. The hindwing is in all respects like that of *D. chrysippus*.

A single male specimen from Karachi has the whole cell of forewing and base of both wings, suffused with deep ferruginous on the *upperside*, and on the *underside* the whole cell and base of forewing only. Another female specimen from Mulleer, Sind, has the subapical band of white spots entirely absent.

The only notice of the occurrence of *D. dorippus* within Indian limits (it is common in Africa) that has been received is from Major C. Swinhoe, who writes from Karachi that he has observed it in Sind in January, June, August, September, November, and December, but never commonly.

31. **Danais genutia,*** Cramer.

Papilio genutia, Cramer, Pap. Ex., vol. iii, pl. ccvi, figs. C, D (1779); *Papilio genutius*, Herbst, Pap., pl. cliv, figs. 1, 2 (1794); *Salatura genutia*, Moore, Lep. Ceylon, p. 6, pl. iv, figs. 2 male, 2*a* female (1880); *Danais plexippus*, auctorum, *nec* Linnæus.

HABITAT: Throughout India and Burma up to 7,000 feet elevation.

EXPANSE: 2·6 to 4·0 inches.

* For figure, see page 7.

DESCRIPTION: UPPERSIDE; *Forewing* bright rich fulvous, with the costa, the whole apical area to the inner angle, including the upper end of the cell, and decreasingly to the base along the inner margin—black. The median nervure and the first and second median nervules, which alone cross the fulvous ground, broadly bordered with black. On the costa there is first a small spot about one-third the length of the wing from the base, then two spots at the end of the cell divided by the first subcostal branch—white. A white spot touching, but outside the cell, between the discoidal nervules; an irregular band of six white spots from the costa to the second median nervule; this band increases to the fifth spot, which is the largest; the sixth is much smaller and rounded. There is generally one, sometimes two, round white spots on the inner edge of the black apical area between the second median nervule and the submedian nervure, one in each interspace; a submarginal and marginal series of white spots, more or less obsolete, especially towards the apex, but always present and large between the second and third median nervules. *Hindwing* lighter fulvous, margined with black, on which are placed two rows of rounded dots, the inner one evanescent, especially towards the apex. All the nervures broadly bordered with black. UNDERSIDE as above in the *forewing*, except that the area between the subapical band of white spots and the apex is suffused with ochreous. The submarginal and marginal series of spots are larger, as are also the spots on either side of the first median nervule when present. *Hindwing* only differs from the upperside in having all the nervures bordered with white outside their black margins; the two series of dots much larger. *Cilia* black, spotted with white at the interspaces. *Head* and *thorax* black, spotted and streaked with white. *Abdomen* ferruginous, spotted with white. In some specimens on the upperside of the *hindwing*, the abdominal margin and the fulvous spaces are more or less streaked or suffused with violet-white, showing an approach to *D. melanippus*. The FEMALE differs from the male only in the absence of the sexual mark, which in that sex is placed against the first median nervule and lies between it and the submedian nervure. On the upperside this mark is entirely black; on the underside black, centred with a short white streak.

"LARVA, cylindrical, black, with a pair of black fleshy filaments on the third, sixth, and twelfth segments, the first pair longest; each segment with one interrupted white streak along its anterior edge, succeeded by three white transverse spots, followed by two transversely elongated yellow spots, the posterior edge of the segment having two parallel interrupted white streaks; lateral band yellow, crossed at the middle of each segment by a black line; abdominal line black; head and feet black, ringed with white. PUPA somewhat cylindrical, posterior end hemispherical, anterior ending in two slight prominences; bright green, with a dorsal ring of silvery dots, and a few scattered golden dots." (*Moore*, Lep. Ceylon, p. 6.)

This species has hitherto passed as *D. plexippus*, Linnæus, but Messrs. Salvin and Godman have recently shown conclusively in their "Biologia Centrali-Americana," that Linnæus' name applies to an American species of this type, which is distinct from the Asiatic species. The error appears to have originated with Fabricius, and has till quite recently passed undetected. The Indian species must, therefore, stand as *D. genutia* of Cramer, by whom it has been correctly figured.

D. genutia is as widely spread and only less common than *D. chrysippus*. In Tenasserim it was found by Limborg throughout the cold weather up to 5,000 feet; in the Nicobars it is common; Captain C. T. Bingham found it in Tenasserim in March and April; it is common in the Malay Peninsula in August and September. In the plains of north India it is common throughout the winter; while in the Himalayas and Khasi hills it is most common in the autumn. In Kulu, according to Mr. Graham Young, a few appear in June, and from the middle of August, a succession of broods come out till late in the autumn; in Chumba a few are on the wing in April. On the West Coast it does not appear to be common, at all events in the spring, but in Travancore, according to Messrs. Fergusson and Bourdillon, it is very common in March, and fairly common in April.

32. **Danais nipalensis,** Moore.

D. nipalensis, Moore, Ann. and Mag. Nat. Hist., fourth series, vol. xx, p. 43 (1877).

HABITAT : Katmandu, Nepal.

EXPANSE : 3·9 inches.

DESCRIPTION : "MALE : UPPERSIDE dull ferruginous black. *Forewing* with the basal internal half bright ferruginous, intersected by the black veins ; an oblique subapical narrow series of five white spots, the second, third, and fourth elongated, the fourth longest, the fifth subconical ; a series of two median submarginal, and four marginal small white spots. *Hindwing*, with the spaces between the veins to beyond the disc ferruginous, intersected by broad black-margined veins. *Cilia* alternate black and white. *Head*, *thorax*, and *legs* black, spotted and streaked with white. *Abdomen* ferruginous. UNDERSIDE, paler ferruginous black, marked as above. Nearest to *D. chrysippus*, from which it may be distinguished by the absence of all white markings, except the narrow oblique subapical series on the forewing." (*Moore*, l. c.)

This is apparently a local species ; no record of its occurrence elsewhere can be traced. It seems to be more nearly related to *D. genutia* than to *D. chrysippus*, but the description is given as originally recorded. We have never seen a specimen.

33. **Danais philene,** Cramer.

Papilio philene, Cramer, Pap. Ex., vol. iv, pl. cccIxxv, figs. A, B (1781) ; Herbst. Pap., pl. cliv, figs. 3, 4 (1794) ; *Danais philene*, Godt., Enc. Méth., vol. ix, p. 187, n. 37 (1819) ; *Euplœa philene*, Hübn., Verz. bek. Schmett., p. 15 (1816.)

HABITAT : North India (?), Java, Amboyna.

EXPANSE : 3·6 inches, (from Cramer's plate).

DESCRIPTION : "Wings slightly sinuous, dark ferruginous, with here and there some nervures and the hinder margin of a blackish-brown, the latter dotted with white ; the *forewing* blackish at the apex, with a very white maculated band ; the *underside* of the *hindwing* with some bifid white spots on the disc ; size about the same as *D. plexippus* [*D. genutia*]. *Forewing*, blackish brown, with a large lengthened patch of dark ferruginous red at the base, divided by a blackish nervure ; a subapical white band of five spots, of which the four nearest the costa are oblong and joined, the fifth almost round and separated from the others ; this band is preceded interiorly by a longitudinal white line on the costa, and the hind [outer] margin has two rows of equally white spots, of which the inner line is shorter. *Hindwing*, dark ferruginous with blackish nervures, the outer border smoky brown, with a double or single row of white dots. The UNDERSIDE of the *forewing* is, with a slight difference in shade, almost the same as the upperside. In the *hindwing* it differs in that the disc has five white bifid spots, and the pocket in the male is marked with a small longitudinal line of the same colour ; also that the spots on the border are brighter, a little larger, and the two rows are both complete. The thorax is black with white dots ; the abdomen is brownish above, yellowish below ; the antennæ are black."

The above is Godart's description of this species, which is included in the Indian list on the strength of a notice by Mr. Butler* of a small collection of Butterflies made in the North-West Punjab, containing the following entry :—"*D. philene*, Cheta, about twenty miles from Murree ; found in lime and orange gardens." No other record of its occurrence has been traced, nor is it known whether any specimen exists in Indian collections ; and it seems likely that a mistake was made in the identification, for the insect belongs to the Indo-Malayan region, and wide-spread as many of the species of *Danainæ* are, it would be a singular occurrence if a Malayan species were found in the North-West Himalayas and not in the vast

* Pro Zool. Soc., Lond., 1870, p. 725, n. 2.

intermediate region. It appears to differ from *D. genutia* chiefly in the nervures of the forewing being without the black borders on upperside, in the presence of the five bifid white spots in the disc of the hindwing on the underside, and in the tone of the ferruginous basal area of the wings.

The caterpillar and chrysalis were discovered by Horsfield in Java, and are figured in the Cat. Lep. E. I. C., plate iv., figs. 5, 5a (1857). The caterpillar has only four tentacula, two long ones on the third segment, and two short ones on the last segment but one; it feeds in Java "on a species of *cissus*, bearing the native name of *Galing*." (*Horsfield.*) It was found in December. The chrysalis is short and very obtuse. These figures are almost identical with those given at pl. iii, fig. 8, 8a, of Horsfield's Catalogue (1829), of *D. plexippus* (= *D. genutia*), and gives rise to the suspicion that the metamorphoses shown belong to one and the same insect, most probably of *D. philene*.

34. **Danais hegesippus,** Cramer.

Papilio hegesippus, Cramer, Pap. Ex., vol. ii, pl clxxx, fig. A (1777); Fabricius, Ent. Syst., vol. iii, pt i, p. 52, n. 160 (1793); *Euplœa hegesippe*, Hübner, Verz. bek. Schmett., p. 15 (1816); *Danais hegesippe*, Godart, Enc. Méth., vol. ix, p. 189, n. 42 (1819); *Danais melanippe*, G. R. Gray, Lep Ins. Nepal, p. 10, pl. ix, fig. 1 (1846): *Danais chirona*, G. R. Gray, l.c., p. 10 (1833).

HABITAT: Eastern Bengal, Orissa, Burma.

EXPANSE: 2·7 to 3·6 inches.

DESCRIPTION: UPPERSIDE: *Forewing* as in *D. genutia*, except that the fulvous streak below the submedian nervure is never present in *D. hegesippus*, the macular band of white spots across the apex is less prominent, and the sixth spot of this band is placed much nearer the base of the wing; the spot below it between the second and first median nervules is also usually much more prominent. In Cramer's figure the narrow fulvous streak below the submedian nervure is shown, but in a long series of Indian specimens before us it is invariably wanting. *Hindwing* fuscous brown in Cramer's plate, and also in some Rangoon specimens, but usually almost black. All the fulvous ground-colour of this wing in *D. genutia* is replaced in *D. hegesippus* with pure white, the streaks in the interspaces beyond the cell being much more restricted, in some specimens being much reduced and sullied with fulvous at the edges; the marginal and submarginal series of round spots always complete, and more prominent than in *D. genutia*. UNDERSIDE similar to the upperside, but all the white markings on the *hindwing* are more prominent, and except the two long abdominal streaks are outwardly suffused with fulvous, increasing in extent towards the costa, the spaces above the subcostal nervure being almost entirely fulvous. The FEMALE only differs from the male in the absence of the sexual mark on the hindwing.

D. hegesippus does not seem to be very common anywhere. Mr. de Nicéville, who has carefully collected in the neighbourhood of Calcutta, notes: "On November 15th and December 18th, 1878, in a garden on the outskirts of Calcutta, I took two specimens of this insect on each occasion and have never seen it since. It seems to have a lower, and, if possible, lazier flight than *D. genutia*, from which species by reason of its white striped lower wings, it is easily distinguished even on the wing." Specimens may not unfrequently be found in the collections made by soldiers for sale in the neighbourhood of Rangoon, but neither Limborg nor Captain Bingham met with it in Tenasserim, in the winter and early summer months. There is one specimen in the Indian Museum, Calcutta, from Orissa; and another from the old East India Company's Museum, labelled "Dukhun, Colonel Sykes," but we know of no other specimen taken in that part of India, the locality is probably erroneous.

35. **Danais nesippus,** Felder.

D. nesippus, Felder, Verh. zool.-bot. Gesellsch. Wien, vol. xii, p. 486, n. 123 (1862); Reise Nov., Lep., vol. ii, p. 347, n. 484 (1867).

HABITAT: Nancowry, Sambelong, Nicobars.

EXPANSE: 2·8 to 3·2 inches.

DESCRIPTION : "MALE : Wings above fuscous. *Forewing*, with the triangular basal area, rufescent fulvous ; a three-fold subcostal spot (the cellular part and interior rather narrow), two small cellular spots, a small subapical band of five increasingly elongated spots, two spots between the median branches, and a double submarginal series of unequal spots (the inner row shorter), white. *Hindwing* paler, with the cellular area, and increasing subulate spots between the second subcostal branch, and the internal margin and somewhat large spots in two series before the margin, white. UNDERSIDE : *Forewing* paler, of a slightly violet tinge, the [fulvous] patch broader, with the white spots [of the upperside] but larger. *Hindwing* suffused with violet-hoary, with a serpentine gloss in certain positions, with basal spots, two subcostal (the first at the base emitting a line), and others on the border larger than those of the upperside, white ; with the costa fulvous from the base, the radiating spots much more ample, with the upper ones exteriorly stained with ochraceous-fulvous, and with the two subcostal ones also of the same colour. FEMALE : Wings wider, more deeply coloured than in the male. A local form of *D. melanippus*, Cramer." (*Felder*, l.c. in Reise Novara).

Felder also remarks* that *D. nesippus* is "a local variety of *D. hegesippus*, Cramer, which as well as this and *D. melanippus*, Cramer, is again a local subspecies of *D. lotis*.† The Nicobar form differs from all the numerous specimens of *D. hegesippus*, which I received from Java and Malacca in the narrow, rust-red coloured streaks of the forewing, and the much narrower white radial spots of the hindwing. Regarding the latter difference it is nearer allied to *D. melanippus*, but the above mentioned streaks in this species are coloured ochre-brown."

We have a large series of this insect in our collection ; it is an insular form of *D. hegesippus*, from which it differs in the almost complete absence of the first band of white spots outside the cell of the forewing, which in *D. hegesippus* are prominent, and the white streaks in *D. nesippus* are somewhat narrower. Mr. de Roëpstorff took numbers of the species at Nancowry in August ; and it is recorded by Felder from Great Nicobar.

36. **Danais melanippus**, Cramer.

Papilio melanippus, Cramer, Pap. Ex., vol. ii, pl. cxxvii, figs. A. B (1777) ; *Papilio hegesippus*, Herbst, Pap., pl. clv, figs. 7, 8 (1794).

HABITAT : Nepal, Assam, Penang, Malacca, Java.

EXPANSE : 3 inches.

DESCRIPTION : Differs from *D. genutia* in the *forewing* in not having any fulvous between the second and third median nervules, or below the submedian nervure ; the macular subapical white band is less prominent, and the series between it and the cell is reduced to a spot on the costa. On the *hindwing* the fulvous patch in the cell pales almost to white inwardly, and all the streaks beyond the cell are very narrow and short, the abdominal streaks are also narrow. The marginal and submarginal series of white spots are very small and obsolete, especially the inner series, about the region of the third median nervule. The UNDERSIDE differs from that side of *D. genutia* in the same way as the uppersides of the two species differ one from the other.

D. melanippus is a native of Java ; the above description is taken from Cramer's figure of a male specimen from that island. It is certainly very rare in India, if indeed the records of its occurrence are not cases of mistaken identity, though Butler, in his paper on the Malacca Butterflies, gives the above-quoted Indian localities for it.

* Verh. zool.-bot. Gesellsch. Wien, vol. xii, p. 486 (1862). † From Java.

Genus 4. EUPLŒA, Fabricius. (PLATES VII—IX).

Fabricius, Illiger's Mag., vol. vi, p. 280 (1807); Doubleday, Gen. D.L., p. 86 (1847); Butler, Proc. Zool. Soc. Lond., 1866, p. 268, *Monograph*; id., Journ. Linn. Soc., Zoology, vol. xiv, p. 290 (1878), *Monograph*; *Trepsichrois, Crastia, Salpinx*, Hübner, Verz. bek. Schmett., pp. 16, 17 (1816).

"ANTENNÆ, rather more than half as long as the whole length of the body, gradually clavate. FORELEGS, with the femur and tibia about equal in length; the tarsus shorter; of the MALE cylindric, rather tapering to a point at the extremity, indistinctly biarticulate; second joint about one-third the length of the first, both clothed with scales and hairs; of the FEMALE, clavate, quadriarticulate; the first joint longer than the rest combined, much broadest at the apex, where it has a stout spine on each side; second and third short, furnished with a tuft of hair on each side near the base, and a spine at the apex; the fourth joint minute, furnished with a tuft of hairs. MIDDLE and HINDLEGS strong, the claws rather stout, curved. The PARONYCHIA divided into two laciniæ; the outer elongate, lanceolate, hairy, as long as the claw; the inner not quite equal in length to the outer, more hairy, elongate, lanceolate, the apex curving inward over the base of the pulvillus. PULVILLUS not so long as the claws, jointed; the second joint broad, corneous." *(Doubleday).*

LARVA, with several pairs of elongate fleshy tentacula, usually on the penultimate, and on two or more of the anterior segments. PUPA, short, obtuse, with the abdomen much rounded.

The *Euplœas* are of rather large size; usually of a swarthy brown or black colour, sometimes rufescent, generally with a velvety appearance, and often with brilliant blue or purple reflections, especially in the forewing; more or less spotted with white or violet; sometimes streaked with white on the hindwing; typically the spots are arranged in a double marginal series on both wings, sometimes with a third discal row, but the extent to which these markings are developed varies greatly, and in many species some or most of them are entirely wanting. The thorax and head are spotted with white, especially below. In the *forewing* the inner margin is, in the MALE, usually much rounded outwardly, with a convex outline often covering a large portion of the hindwing even when the wings are extended for flight; in the FEMALE it is usually straight or very slightly convex towards the base, sometimes even emarginate or slightly concave towards the exterior angle. In some of the groups the males have one or two impressed silky streaks on the interno-median area of the forewing, composed of scales differently formed from those on the rest of the wing. These streaks, together with a patch of differently formed and paler scales present in some groups on the anterior portion of the upperside of the hindwing, and covered by the forewing, are probably scent-producing organs. The sexes in a few species also differ materially in the colour of the hindwing, the males having the wing nearly uniform dark colour, and the females having it streaked with white; but as a rule the differences in colour are slight, and the sexes are only to be distinguished by their structure and outline, and by the presence or absence of the sexual marks on the wings.

About 160 species of *Euplœa* have been described; it is an eastern-Asiatic genus, most highly developed in the Malay Archipelago, and extending into Australia. Species also are recorded from the islands of Mauritius, Bourbon, and Madagascar. Upwards of forty species are included in the Indian list, but owing to the variations in individuals and the indefiniteness of many of the original descriptions, their identification is often very difficult; many of the species inhabiting the same locality are so similar in appearance on the wing that some are apt to be overlooked. They affect patches of scrub in cultivation, and the edges of forests, and fly rather slowly and heavily; they are most abundant in warm, damp, tropical climates, and seem to shun dry places, whether cold or hot. Only a single species, *E. core*, is found commonly in India proper; no less than twenty-two species occur in Burma, of which some extend to north-east India; seventeen species are found in north-east India including those extending from Burma; seven species are found in the Andamans and Nicobars, all but two of which appear to be confined to those islands; three only are found in south India, but in Ceylon there are six species, all but one of which occur nowhere else within Indian limits. The foregoing remarks include as species all that have been separately described, although, as in the case of the allies of *E. core*,—*E. asela*, *E. vermiculata*, and *E. subdita*, the different forms are almost certainly only geographical varieties.

This genus was divided by Hübner into three or four groups, each with a well-marked general outline; and more recently Butler has extended this division into seven groups; more recently still Moore has discriminated two other groups, which will be noted further on, and is about to monograph the whole genus; but the characters of the new groups he has given seem to agree with those already discriminated by Butler, whose definitions are used in this book.

Key to the Groups of EUPLŒA.

A. With a large patch of whitish or pale yellow scales on the anterior portion of the hindwing in the male.

a. Forewing in the male, with the inner margin strongly arched, and having an elongated silky or blue spot depressed on the interno-median area; of medium size.

I. SALPINX* (Hübner, as restricted by Butler).

b. With no silky or blue depressed spot on interno-median area; of very large size.

II. MACROPLŒA (Butler).

c. With no silky or blue depressed spot on interno-median area; of small size.

III. CALLIPLŒA (Butler).

B. With a small yellow patch within the cell of hindwing at origin of first subcostal nervule; no brand on forewing in the male.

IV. TREPSICHROIS (Hübner).

C. With no yellowish patch on hindwing in the male.

a. With no trace of a brand on the interno-median area of forewing of male.

V. CRASTIA (Hübner).

b. With a single more or less strongly defined brand on interno-median area of forewing of male.

VI. EUPLŒA (Fabricius, as restricted by Butler).

c. With two well-defined brands on interno-median area of forewing in male.

VII. STICTOPLŒA† (Butler).

There is something very remarkable about these groups; they are based almost entirely on the sexual marks of the male insect, but in many cases these distinctions are accompanied by differences of outline that cannot be mistaken; the most curious point is that frequently the same style of colouration runs through two or more of the groups; thus *Salpinx sinhala* and *Stictoplœa coreoïdes* so closely resemble each other and *E. core* in colour and markings that until quite recently the distinctions were unrecognised. In like manner *Stictoplœa grotei* closely resembles *E. limborgii* in colour and markings; some specimens of the female of *Macroplœa castelnaui* are a very good likeness on a large scale of *E. godartii*. *Salpinx margarita* bears a similar resemblance to *Crastia cupreipennis* which occurs with it in the Mergui Archipelago and Upper Tenasserim, and *Crastia camaralzeman* from Siam. *Crastia simulatrix* closely resembles *Euplœa camorta*, &c., &c. The difficulty of distinguishing the species on the wing is a great hindrance to observation of the insects in life. The claim of the groups to generic rank appears still to be doubtful, and there is much to be learned in connection with them.

First Group.—SALPINX (Hübner, as restricted by Butler): "For the most part large insects, the males of which invariably have a strongly arched inner margin to the *forewing*, which is frequently ornamented with an elongated depressed silky or blue spot; the *hindwing* invariably with a large patch of whitish or pale yellow, cut by the subcostal nervure."—(*Butler*, Journ. Linn. Soc., Zoology, vol. xiv, p. 295, 1878). The wings are generally ample, and more or less rounded externally. The habitat of this group is extreme north-east India and Burma, extending down the Malay peninsula. Of the Indian species only one is found in the Nicobar islands, and one species is found in the neighbourhood of Calcutta, in Sikkim, and again in southern India and Ceylon; the whole of the remainder are found only to the north and east of the Bay of Bengal. One species of this group, *E. superba*, is taken by Moore in the Lepidoptera of Ceylon, p. 10 (1880), as the type of a new genus which, under the name of *Isamia*, he characterises as follows:—"Wings large, broad; *forewing* in male elongated, somewhat quadrate; apex slightly acuminate; exterior margin oblique, waved; posterior margin convex, with a large sericeous streak between the first median nervule and submedian nervure; *hindwing* triangular, costa long, convex; exterior margin convex, waved; a moderate-sized pale upper discoidal patch."

* Includes *Isamia*, Moore.
† Includes *Narmada*, Moore.

No explanation of any kind is given as to how this differs from *Salpinx* of Hübner, or from *Salpinx* as restricted by Butler, or why the older name has been dropped. *E. superba* and its allies certainly differ from other species of *Salpinx* in the form of the sexual brand of the fore-wing, but it is more probable that they are really different forms of a single species than a group of species forming a distinct genus.

Key to the Indian species of SALPINX.

A. Forewing comparatively narrow and elongated, the apex acute. Males with a prominent elongate sericeous streak on the forewing, somewhat as in true *Euplœa*, scarcely visible on the underside. All more or less shot with brilliant blue; and with a prominent lilac spot in the cell of the forewing on the underside.

a. Forewing with numerous violet or white spots in three series.

a.[1] The brilliant blue shot reaching the submarginal row of spots on the forewing; the border spots of the hindwing white and prominent.

37. E. *(Salpinx)* SUPERBA (North India?), China.

b.[1] The brilliant blue shot reaching the marginal row of spots on the forewing.

a.[2] The border spots on the hindwing very indistinct or obsolete.

38. E *(Salpinx)* ROGENHOFERI, N.-E. India, Burma.

b.[2] The border spots on the hindwing pale, but distinct.

39. E. *(Salpinx)* IRAWADA, Burma.

b. Forewing with few and indistinct spots, no series complete; the border spots of the hindwing white and prominent.

a.[1] The brilliant blue shot variable in extent, but usually covering the basal two-thirds only of the forewing.

40. E. *(Salpinx)* MARGARITA, Tenasserim.

B. Forewing shorter and very broad. Males with a broad short oval sericeous brand, not prominent, generally concolorous with, but paler than, the ground-colour, visible on the underside as a raised dark spot. The blue shot less brilliant and often wanting; no spot as a rule in the cell of the forewing on the underside.

a. Forewing very broad, with a *decreasing* row of submarginal spots, the third largest; border spots of the hindwing small but prominent.

a.[1] Forewing brown, sometimes faintly glossed with blue at the base.

41. E. *(Salpinx)* CRASSA, Burma.

42. E. *(Salpinx)* KRICHSONII, Burma.

b.[1] The basal area of the forewing brilliant blue.

43. E. *(Salpinx)* MASONI, Burma.

b. Forewing less broad, with the row of submarginal spots all nearly equal-sized.

a.[1] The blue shot usually suffusing the entire forewing, but very variable in intensity.

44. E. *(Salpinx)* KLUGII, N.-E. India.

45. E. *(Salpinx)* GRANTII, Cachar.

b.[1] The blue shot brilliant, but not reaching the outer margin of the forewing; the discal series of spots abbreviated, the third considerably the largest.

46. E. *(Salpinx)* ILLUSTRIS, N.-E. India.

E. *(Salpinx)* CHLOE, Malayana.

E. *(Salpinx)* ÆGYPTUS, Malayana.

c.[1] The blue shot usually entirely wanting, faintly present in some specimens; the forewing brown, with border spots as in *E. core*.

47. E. *(Salpinx)* SINHALA, Sikkim, Calcutta, S. India, Ceylon.

C. Forewing shaped much as in the preceding group. Male with a broad *violet* streak on the interno-median area; visible on the underside as a dark raised spot.

a. Forewing with no large white patch from middle of costa; the hindwing without white basal streaks on the upperside.

a.[1] Forewing shot throughout with deep blue: with prominent violet spots.

a.[2] The marginal series of spots partially present near the hinder angle of both wings.

48. E. *(Salpinx)* VESTIGIATA, Malayana.

b.[2] The marginal series of spots absent from both wings.

49. E. *(Salpinx)* NOVARÆ, Nicobars.

b.[1] Forewing blackish-swarthy; the hindwing with the anal angle white.

50. E. *(Salpinx)* LEUCOGONYS, (N.-E. India?), Malacca.

b. Forewing with a large white patch from middle of the costa; the hindwing with white basal streaks on both sides; of smaller size.

a.[1] Wings shot with deep violet-blue.

51. E. *(Salpinx)* RHADAMANTHUS, N.-E. India, Burma.

b.[1] Wings not shot with violet-blue.

52. E. *(Salpinx)* DIOCLETIANUS, (N.-E. India?), Burma.

The first four species, *E. superba*, *E. rogenhoferi*, *E. irawada*, and *E. margarita* are very closely allied, and may possibly be only different forms of the same species; the type of the group is *E. superba*, which has the forewing with three series of violet and white spots and shot with brilliant blue as far as the submarginal series, while the hindwing has two rows of white and prominent border spots; *E. margarita* only appears to differ from it in the almost entire absence of spots on the forewing; and in that it has the blue sfot variable in extent, never reaching beyond the submarginal series of spots, and frequently confined to the basal two-thirds of the forewing; the extent to which the spots on the forewing are present varies greatly in this species, and some examples approach very closely indeed to *E. superba*. *E. rogenhoferi* and *E. irawada*, on the other hand, differ chiefly in having the blue shot of the forewing extending to the outer margin, and the border spots of the hindwing either pale or obsolete; *E. irawada*, the Burmese form, has the spots of the hindwing distinct, while *E. rogenhoferi*, the Assamese form, has, as is the case in several parallel instances, the border spots almost, if not quite, obsolete. Typical specimens can easily be distinguished, but none of the distinctive characters seem to be altogether permanent.

The FEMALES in this group are usually coloured and marked like the males, but lack the sexual brand on the forewing and the yellowish patch on the hindwing, and have the inner margin of the forewing nearly straight. *E. rhadamanthus* and *E. diocletianus* are the only species of this group in which the sexes differ at all widely in colour and markings.

37. Euplœa superba, Herbst.

Papilio superbus, Herbst, Pap., vol. v, pl. cxix, fig. 3, *female*, pl. cxx, figs. 1, 2, *male* (1792); *Papilio midamus*, Fabricius (*nec* Linnæus), Syst. Ent., p. 479, fi. 161 (1775), *female*; *Linnas mutabilis midamis*, Hübner, Samml. Ex. Schmett., p. 16 (1816); *Danais alopia*, Godart, Enc. Méth., vol. ix, p. 177, n. 4 (1819); *Euplœa superba*, Horsfield and Moore, Cat. Lep. E. I. C., p. 131, n. 260 (1857); *Isamia superba*, Moore, Lep. Cey., p. 10 (1880).

HABITAT: (Darjiling *apud* Moore?, North India *apud* Butler?); China.

EXPANSE: 4·2 inches.

DESCRIPTION: MALE: UPPERSIDE.—*Forewing* deep brown, lighter towards the outer margin, suffused with brilliant blue up to the submarginal series of spots. A subcostal spot above the extremity of the cell, bluish-white. A spot in the cell, and a series of six spots, the third and fourth the largest, exterior to it, violet. A long dark impressed sexual mark in the interno-median area. A submarginal sinuous series of seven white spots, the second from the apex the largest, the seventh minute, sometimes geminate. A marginal series of small round white dots, obsolete towards the apex. *Hindwing* cupreous-brown, darkest about the median nervure, very pale on the costal area. A white patch across the subcostal nervure extending into, below, and beyond the cell. A submarginal row of spots, the two upper ones rounded, the third geminated, the remainder elongated; a marginal series of small round spots, all chalky-white. UNDERSIDE bronzy-brown, darkest on the disc. On the *forewing* the discal series of spots are reduced to two, one in each space between the median nervules, the lower elongated, violet-white. The marginal and submarginal series of spots as on upperside, white. The inner margin broadly white. The *hindwing* has several white spots at the base; a small spot in the cell, and beyond it six small streaks, all violet-white. The submarginal and marginal series of spots on both wings as above, except that they are larger and clearer white. The FEMALE differs from the male in the absence of the sexual brand, and the inner margin of the *forewing* being straight, not outwardly lobed, as in the male. No patch of chalky-white scales on the anterior portion of the *hindwing*. Described from specimens from China in the Indian Museum, Calcutta.

We have never seen a specimen taken in India. It is entered in the list of species occurring within our limits on the strength of Horsfield and Moore's and Butler's identifications, but we doubt its occurrence there.

38. Euplœa rogenhoferi, Felder.

E. rogenhoferi, Felder, Reise Nov., Lep., vol. ii, p. 325, n. 446 (1865), *male*; *E. splendens*, Butler, Proc. Zool. Soc. Lond., 1866, p. 272, n. 9, *male*.

HABITAT: Eastern Himalayas, Upper Assam, Cachar, Khasi Hills, Bassein.

EXPANSE: 3·4 to 4·4 inches.

DESCRIPTION: "MALE: UPPERSIDE.—*Forewing* blackish swarthy, shot throughout with greenish blue; the outer margin with two series of white spots, the marginal series not reaching the apex, the submarginal series with the forepart arched from the costa, but not reaching the inner margin; with a short angulated series of seven oblong violet spots placed beyond the cell, and extending from the costa above the cell to the lower median interspace; one spot near the end of the cell; and a pale streak placed below the first median nervule. *Hindwing* paler, slightly bluish, the costal area pale; a rather large ochreous spot placed on the subcostal nervure, and two series of very indistinct spots on the outer margin. The *body* swarthy, dotted with white anteriorly. UNDERSIDE: *Forewing* coppery-fuscous, the inner margin pale, with the series of submarginal spots as on upperside, but the inner series with smaller spots; a spot below the middle of the costa, one near the end of the cell, one below the end of the cell, and one large oblong spot between the median nervules—white. *Hindwing* coppery-fuscous, with two series of white submarginal spots; the inner series being of minute dots; with an angulate series of violet-white spots beyond the end of the cell, and one spot in the cell, and some white dots at the base. *Body* swarthy, the thorax dotted with white."

"Allied to *E. superba*, Herbst [from North India (?) and China], but more brilliantly shot with variable blue-green; the outer margin of the forewing more arched; the costa of the hindwing not so angular; the discoidal spots of the forewing much larger and oblong, and the submarginal spots smaller; the submarginal spots of the hindwing nearly obsolete. Below, the discoidal spots are much more distinct and larger, the submarginal spots of the forewing more numerous, and the inner submarginal series of the hindwing very small, especially towards the apex and anal angle." (*Butler*, l. c.) The FEMALE differs from the male in the absence of the sexual mark on the upperside of the *forewing*, but it has a long pale violet streak on the underside in the position occupied by this mark in the male; the inner margin is also straight, not lobed, as in the male. No anterior creamy-white patch of scales on the *hindwing*. UNDERSIDE somewhat lighter in both wings.

E. rogenhoferi is found, but not very commonly, in Assam, extending through the Eastern Himalayas as far as the valley of the Sardah, which separates Kumaon from Nepal. To the westward of this range it is much rarer than to the eastward. Mr. Wood-Mason took three males and a female in Cachar from April to June. The specimens from Bassein of this group which we have identified as *E. rogenhoferi* agree with the description of *E. irawada*, the next species, and may possibly be referable to it. At any rate the two are closely allied, and only appear to differ in the comparative prominence of the spots on the hindwing and possibly also in the tone of the blue shot.

39. **Euplœa irawada**, Moore.

E. irawada, Moore, Ann. and Mag. Nat. Hist., fourth series, vol. xx, p. 45 (1877).

HABITAT: Henzada, Rangoon District, Burma.

EXPANSE: 3·5 inches.

DESCRIPTION: "MALE: UPPERSIDE, dark blackish brown. *Forewing* glossed with brilliant steel-blue; a lilac-blue spot at lower end of the cell, and a contiguous discal series of six similar spots; a marginal upper series of six small white spots, and a marginal lower row of white dots; an elongated, silky, impressed streak between first median nervule and submedian nervure. *Hindwing* with a flesh-coloured patch extending over upper part of the cell, anterior margin broadly cinereous; a submarginal row of pale oval spots, and a marginal row of small round spots. UNDERSIDE brown. *Forewing* suffused in the disc with black; hind margin broadly and an elongated lower discal spot cinereous white; second discal spot and cell-spot blue, upper spots minute, marginal rows of white spots distinct. *Hindwing* with marginal row of distinct white spots, submarginal row partly obsolete; a small blue spot at end of, and a contiguous series outside the cell." (*Moore*, l. c.)

E. irawada appears to be very rare; we know of no specimens in collections in India, unless those of *E. rogenhoferi* from Bassein referred to above really belong to this species. These specimens answer exactly to the description of *E. irawada*, but they are inseparable from the Assam examples of *E. rogenhoferi*.

40. **Euplœa margarita**, Butler.

E. margarita, Butler, Proc. Zool. Soc. Lond., 1866, p. 279, n. 34; *Salpinx margaritæ*, Moore, id. 1878, p. 823; *E. agamsoni*, Marshall, Journ. A. S. B., vol. xlix, part ii, p. 245 (1880).

HABITAT: Upper Tenasserim, Penang, Malacca.

EXPANSE: ♂, 3·6 to 4·2; ♀, 4·1 to 4·5 inches.

DESCRIPTION: "UPPERSIDE, olivaceous-fuscous; *forewing* fuscescent, shot with blue and green, with one white costal spot; in the MALE with two blue discal spots, one subapical dot, one anal, and one submarginal, ochreous; in the FEMALE with one white discal spot. *Hindwing* of the MALE with the costal margin ochreous-white, a rather large ochreous subcostal spot, and two submarginal rows of ochreous-white spots on the outer margin; of the FEMALE with two rows of spots, those at the anal angle coalescing; the inner row elongate. *Body* swarthy, blackish in front with white spots. UNDERSIDE paler; *forewing* with some scattered submarginal white dots, and one costal, two discal spots, the lower large and elongate, and a lunule in the cell, iridescent; the inner margin pale. Of the FEMALE with an elongate ochreous discal streak placed near the margin. *Hindwing* of the MALE with five dots, of the FEMALE with six discal, and two in the cell, white, iridescent; the submarginal spots as on the upperside; and the base dotted with white. *Body* blackish swarthy, dotted with white. *Antennæ* black." (*Butler*, l c.).

The brilliant blue shot does not, as would be gathered from the original description above, cover the entire forewing; it never extends beyond the submarginal series of spots, and in many specimens it does not cover more than two-thirds of the distance from the base, the whole of the outer portion of the wing being paler bright brown with no trace of blue. In typical *E. margarita*, where the blue shot extends to the position of the submarginal series, the costa is comparatively short, the apex somewhat acuminate, and the outer margin distinctly convex; on the other hand, where the blue shot is confined to the basal two-thirds, the costa is longer, the apex rounded, and the exterior margin straighter, sometimes even somewhat emarginate; this latter form was, owing to the wording of the original description, redescribed as *E. adamsoni*,* Marshall, (Journ. A. S. B., vol. xlix, part ii, p. 245, 1880). It is possible that the two forms may still be distinct, but numerous intermediate varieties occur, and we are unable to separate them.

Euplœa margarita has as yet been found only in Tenasserim and the Mergui archipelago, where Dr. J. Anderson took it somewhat commonly in the cold weather. Captain C. H. E. Adamson took a single male at Moulmein in the autumn; another male was subsequently taken at the Mayla Choung in September; numerous specimens were taken by Captain C. T. Bingham in the Thoungyeen forests in December; and again in June by Captain Adamson near Moulmein. The FEMALE differs from the male in the absence of the usual sexual marks, namely the silky stripe on the forewing and the yellowish-white patch on the hindwing; the sexual mark on the forewing is however replaced on the underside by a lengthened violet streak in the position of the mark in the male; also in having the inner margin of the forewing straight, not convex, and the submarginal series of spots on the hindwing considerably larger and more elongate, the spots in and around the cell are also more prominent.

The next three species, *E. crassa*, *E. erichsonii*, and *E. masoni*, are also very closely allied; typical specimens of each are easily separable, but numerous intermediate forms occur, and all three are found in the same localities. It is probable that they are all merely varieties of one species, *E. erichsonii*; the extent to which the submarginal series is continued towards the

* *Euplœa adamsoni*, Marshall. HABITAT: Moulmein. EXPANSE. 3·6 to 4 inches. DESCRIPTION: MALE; Allied to *E. superba*, Herbst, but differing on the UPPERSIDE of the *forewing* in that the brilliant blue gloss is confined to the basal two-thirds not reaching to the costa or the inner margin, and that the spots are reduced to four in number, all very small, one subcostal above the end of the cell, and one at the end of the cell, both lilac; and two near anal angle, one marginal, the other submarginal, white. *Hindwing* as in *E. superba*.

hinder angle; the spots when present of the discal series, and the intensity of the blue shot when present, are all extremely variable. In all three the great breadth of the wings, the comparative shortness of the forewing, and the extremely convex inner margin of that wing in the males distinguishes them from other species of *Salpinx*, and the enlargement of the third and adjacent spots in the submarginal series is also a very distinctive feature which is found in no other species of *Euplœa* in this country, except in *E. (Crastia) bremeri* and *E. vermiculata* to a lesser degree; the enlargement of the third spot in the discal series of *E. (Salpinx) illustris* indicates an affinity with this group.

41. Euploea crassa, Butler.

E. crassa, Butler, Proc. Zool. Soc. Lond., 1866, p. 278, n. 31; *Salpinx crassa*, Moore, id, 1878, p. 822.

HABITAT: Burma, Siam.

EXPANSE: ♂, 3·6 to 4·0; ♀, 3·5 to 4·1 inches.

DESCRIPTION: "UPPERSIDE coppery-olivaceous, slightly swarthy, and shot with blue at the base; *forewing* with the apex very acute, with two rows of white submarginal spots, the inner row rather large towards the apex, and violet-white; with three discal dots behind the extremity of the cell, and one costal spot, violet-white. *Hindwing*, with the costa white, two series of white spots, the inner row towards the apex a little the larger. The *body* swarthy, *abdomen* bluish, and the *head* spotted with ochreous. UNDERSIDE, paler; *forewing* with two series of spots, the inner apical, the outer continued; one large internal spot, one costal, and often two behind the end of the cell, roseate-white. *Hindwing* with two submarginal rows of spots, and dotted with white at the base; *abdomen* ashy, spotted with white in the middle." (*Butler*, l. c.)

E. crassa, as we identify it, occurs in Rangoon in June; and a number of specimens were taken by Limborg in Upper Tenasserim in the cold weather. Three of these latter specimens, now in the Indian Museum, Calcutta, have the submarginal row of spots on the upperside of the forewing complete, but one of them shows indistinct traces of a discal series. Of five males and four females taken by Dr. J. Anderson in the Mergui archipelago in the cold weather, three males and one female shew traces of a discal series of spots. See remarks on the following species, *E. erichsonii*.

42. Euploea erichsonii, Felder.

E. erichsonii, Felder, Reise Nov., Lep., vol. ii, p. 324, n. 444 (1865).

HABITAT: Eastern Himalayas, Cachar, Burma.

EXPANSE: 3·6 to 4·2 inches.

DESCRIPTION: "MALE:—The *cilia* striolated with white. UPPERSIDE, dilute bronzed or rufescent-swarthy, the basal half deeper coloured and slightly tinted with violet in certain lights. *Forewing* with a short interior silky streak; eight submarginal spots in a row slightly bent towards the costa, opalescent-white, dotted with violet round the edge, enclosing a small white spot; the three upper ones larger than the others, increasing in size from the costa, and placed very close together; the remainder decreasing in size. A marginal row of small white spots placed in pairs between the nervules; sometimes also two narrow violet-white spots outside the end of the cell. *Hindwing* pale anteriorly, the costal margin pearly-white, with two white spots; also eight small external decreasing spots, and a marginal row of smaller spots, all white. UNDERSIDE, paler, with the submarginal spots as above, but whiter. *Forewing*, with the depressed internal spot, a subcostal spot, another median rather large, sometimes a third above it, and two small ones beyond the cell, lilac-white; the submarginal spots much smaller than on the upperside, dot-shaped, and white. *Hindwing*, with white spots at the base; the two upper of the external spots smaller than on the upperside, and one above these dot-shaped; the remainder larger than on the upperside, and whiter. FEMALE: UPPERSIDE, paler than in the male, the markings similar, often indeed larger (the lower submarginal ones sometimes entirely absent or evanescent), but the marginal spots are sometimes dot-like. *Forewing*, with an obsolete subcostal spot, violet." (*Felder*, l c.)

This species has been considered and most probably is identical with *E. crassa;* we republish both original descriptions, as there are two distinct forms—the one with no discal spots and the submarginal row complete on *forewing*, the other with a discal row, and the submarginal series incomplete; but among the numerous specimens in the Indian Museum, and in our collections, there are no less than eight which have the submarginal series abbreviated, and the discal series wanting; and it is impossible to say to which of the two species, if distinct, these specimens should be referred: probably, they are really all one species which will stand as *E. erichsonii*, Felder. The form we identify as *E. erichsonii* is common in the neighbourhood of Moulmein in the autumn. Captain C. H. E. Adamson has sent us a specimen taken in June, in that locality, and we have one specimen taken at Rangoon in June, and Captain C. T. Bingham has taken it in the Meplay Valley in February, and in the Thoungyeen forests in May. In the Indian Museum, Calcutta, there are four males and two females taken by Limborg in Upper Tenasserim in the cold weather, and one female from Cachar taken by Mr. Wood-Mason in April.

43. **Euplœa masoni**, Moore.

Salpinx masoni, Moore, Proc. Zool. Soc. Lond., 1878, p. 823.

HABITAT: Upper Tenasserim; Taoo, 3,000 to 5,000 feet; above Ahsown.

EXPANSE: 3·25 to 4·2 inches.

DESCRIPTION: "MALE.—Allied to *E. crassa*, Butler, but differing in its darker colour, in the basal area of the *forewing* being bright glossy blue, and the marginal spots on this wing confined more to the apex. *Hindwing*, less convex along the exterior margin; otherwise similarly marked. From *E. klugii*, Moore, this species may be distinguished by the blue gloss being confined to the basal area, whereas in *E. klugii* it is more brilliant, and suffuses the entire wing." (*Moore*, l.c.) The prominence of the two rows of marginal spots on the hindwing in this species, as well as the breadth of the wings, distinguish it from *E. illustris*.

E. masoni has been taken only in Tenasserim, where it is not uncommon, though less so than either of the others. The specimens in our collections, which accord well with this description, are barely if at all separable from *E. erichsonii*.

44. **Euplœa klugii**, Moore.

E. klugii, Moore, Horsfield and Moore, Cat. Lep. E I. C., vol. i, p. 130, n. 258 (1857).

HABITAT: N. India, Bhutan, Cachar, Sylhet, Upper Burma.

EXPANSE: 3·0 to 4·1 inches.

DESCRIPTION: "MALE: UPPERSIDE deep brown, having on the *forewing* a brilliant blue gloss, a submarginal row of small bluish-white spots, and an inner parallel row of larger spots, also a bluish spot on costal margin; one within discoidal cell; two linear bluish marks, one between each discoidal nervule; and a rather indistinct bluish mark between the submedian and median nervules. *Hindwing* paler brown, darkest and glossed with blue in the middle; a submarginal row of white spots and a short inner row from anterior margin; also a patch of creamy-white near middle of the wing. UNDERSIDE brown. *Forewing* with the two rows of *white* spots smaller; one spot on costal margin, one small narrow spot between second discoidal and first [? third] median nervules, and a larger spot between second and third [? first] median nervules; a creamy-white patch on posterior base of the wing. *Hindwing*, with two rows of white spots. FEMALE: UPPERSIDE nearly as in male. *Forewing*, with the submarginal row of spots obsolete. *Hindwing*, pale brown, darkest and slightly glossed with blue in the middle; two white spots only of inner row distinct, the rest of two rows indistinct; without the creamy-white patch. UNDERSIDE, nearly as in male, but not having the creamy-white patch. Shape of wings as in *Euplœa superba*, Herbst." (*Moore*, l.c.)

This is a very variable species. The blue gloss is much deeper and more brilliant in some specimens than in others, and in one male and three females from Cachar, and one female from Sylhet, it only reaches to midway between the disco-cellular nervules and the submarginal series of spots, and moreover the gloss is not at all vivid even where present. In some examples, taken by the Yunan Expedition, probably in Upper Burma, the marginal series of dots on the forewing is entirely wanting; in Cachar and Sylhet specimens this series is sometimes confined to six or seven spots towards the hinder angle, in others it is complete to the apex; the submarginal series is also equally inconstant; in some specimens there are only five spots, in others the series is complete. These spots also differ in size and colour—some are small, equal-sized, round and white, others are large, elongated, unequal-sized and violet; some specimens have a very prominent cell spot and a discal series of four spots, others again are without all these spots. The two marginal series of spots on the hindwing are also very inconstant; in some examples they are quite obsolete, in others as prominent as in *E. superba*. The underside is also as diversely marked as the upperside, but it seems clear even from the specimens in the Museum that all these are but casual variations of the same species.

Mr. Wood-Mason met with this species commonly in Cachar from April to June; and Mr. A. O. Hume took it in the eastern hills of Manipur in May.

45. **Euploea grantii**, Butler.

Salpinx grantii, Butler, Trans. Ent. Soc. Lond., 1879, p. 2.

HABITAT: Cachar.

EXPANSE: 3·92 inches.

DESCRIPTION: "FEMALE: *Forewing* above rich piceous brown, shot with purple, darkest in the centre, and palest at external angle, a small white subcostal spot just above the end of the cell, a crescent-shaped lilac spot in the cell, a circular spot on the first median interspace, two fusiform spots beyond the cell, and a series of seven spots, the sixth pyriform, parallel to the outer margin: all these spots lilac with white centres; an ill-defined lilac spot on the second median interspace, a submarginal series of eight white dots between the lower radial and the external angle. *Hindwing* piceous brown, faintly shot with purple, the costal and external areas broadly paler, two series of pale brown spots parallel to the outer margin, the first of the inner series white-centred, costal border whitish. UNDERSIDE olive-brown. *Forewing* with the median area suffused with piceous, inner border whitish, a pinky-white subcostal spot, and three in an increasing oblique series above each of the median nervules; three or four scattered white dots in an interrupted discal series parallel to the outer margin, and six rather larger white dots in a submarginal series between the lower radial and the external angle. *Hindwing* with several white dots at the base, a discal series of ten white spots, the upper three rounded, in an oblique subapical series, the remainder rather elongated and parallel to the outer margin; nine white submarginal dots between the radial and the anal angle."

"This species may readily be distinguished from *E. splendens*, ♀ [= *E. rogenhoferi*] by the greater width, and less brilliant purple (not blue) shot of the forewing; also in the more numerous submarginal spots of the forewing, the inner series being, moreover, larger and lilac, whereas in *S. splendens* [= *E. rogenhoferi*] they are pure white, with pale violet borders; the discoidal spot not present on the underside, but an additional spot beyond the cell, the outer spots smaller; no lilac dots beyond the cell of hindwing." (*Butler*, l.c.)

From the description this species seems nearest allied to *E. klugii*. Out of a very long series of this latter species in the Indian Museum, Calcutta, we are able to pick out individual specimens that agree with the description of *E. grantii*, but we are unable to separate these specimens from *E. klugii*, which is one of the most variable of *Euplœas*. It appears to us that *E. grantii* is only one of the numerous varieties of *E. klugii*, but we have retained the original description of it as a reference to the type alone can settle the question whether it is a distinct species or not.

46. **Euploea illustris,** Butler.

Salpinx illustris, Butler, Journ. Linn. Soc., Zoology, vol. xiv, p. 294, n. 36 (1878).

HABITAT : Sylhet.

EXPANSE : 3·9 inches.

DESCRIPTION : MALE : "Nearly allied to *E. klugii*, Moore, but the outer border of the *forewing* deep chocolate-brown, not covered by the blue shot, and with the white spots upon it smaller; the discal series of spots abbreviated, not extending below the inferior discoidal interspace; the third spot in the series considerably larger." (*Butler*, l. c.)

This appears to be a very distinct species from either of the two foregoing, though it may ultimately prove to be only a variety of *E. klugii*; and it seems to be rare. The Indian Museum, Calcutta, possesses a single male specimen; the female is as yet unknown.

Two allied species, *Euploea chloë*,* Guérin, and *Euploea ægyptus*,† Butler, occur in the Malay peninsula, &c.

47. **Euploea sinhala,** Moore. (PLATE VII, FIG. 12 ♂ ♀).

E. sinhala, Moore, Ann. and Mag. Nat. Hist., fourth series, vol. xx, p. 45 (1877); *Isamia sinhala*, Moore, Lep. Cey., p. 10, pl. v, fig. 1 (1880), *male.*

HABITAT : Sikkim, Calcutta, South India, Ceylon.

EXPANSE : 3·3 to 4·3 inches.

DESCRIPTION : "MALE : UPPERSIDE dark velvety olive-brown, external margins paler. *Forewing* with a short broad oval sericeous streak between the lower median and submedian veins, a submarginal row of small ochreous-white spots, and marginal lower row of minute spots. *Hindwing* with a broad flesh-coloured discoidal patch; costal border broadly cinereous, a submarginal series of oval ochreous-white spots, and marginal series of small round spots. UNDERSIDE paler olive-brown throughout. *Forewing* with hind margin broadly cinereous; the sexual mark dusky; a curved discal series of whitish spots near the cell; both wings with a submarginal and marginal series of spots as above. *Body* black; thorax, head, palpi and forelegs white spotted." (*Moore*, Lep. Ceylon, p. 10). The FEMALE differs from the male in the absence of the sexual brand, and the inner margin of the forewing being straight,

* *Euploea chloë*, Guérin. HABITAT : Penang, Malacca, Johore, Sumatra. EXPANSE : Male, 3·8 inches. DESCRIPTION : "Wings entire, swarthy. *Forewing* shining violet at the base (in certain positions); both wings on both sides with white marginal spots arranged in a double series. UNDERSIDE with discal spots white and tinted with violet."

"Intermediate between *E. alcathoë* and *E. coreta* of Godart. UPPERSIDE, both wings blackish brown, with a beautiful vivid violet-blue reflection, occupying the greater part of the forewing from the base to just beyond the middle (in the male, the only sex that we have seen). The *forewing* has on the UPPERSIDE near the costa and beyond the middle two small scarcely visible bluish streaks, and near the apex four white spots. Also on the external border a row of white dots starting from the internal angle and not reaching the apex. *Hindwing* on both sides with two rows of white spots on the hinder border, of which the interior are rather oblong; on the upperside it has also at the middle and near the costal margin a large triangular well defined patch of dingy-white. UNDERSIDE of both wings of a glistening brown. *Forewing* with the same marks and spots as on the upperside, but a little larger; the two little streaks near the costa are much more prominent and whiter. Beyond the four spots near the apex there are three others very small, linear, forming a parallel band in the line of the margin; two white spots encircled with violet in the middle, below which is a rather large oblong white spot. UNDERSIDE of the *hindwing* has besides the two rows of white spots on the border seven small violet-white marks, and some small white dots at the base. *Cilia* alternately black and white. *Body* and *head* black, spotted with white." (Guérin in Delessert Souv. Voy. d. l'Inde, pt. ii, p. 71, 1843).

† *Euploea ægyptus*, Butler. HABITAT : Singapore, Sumatra. Borneo. EXPANSE : Male, 4 inches. DESCRIPTION : "MALE : Wings elongate, swarthy on upperside. *Forewing* with a short shining discal streak, five white subapical spots, and one indistinct rosy subcostal spot, two minute costal streaks. *Hindwing* with two submarginal rows of white, sometimes indistinct dots, the costal margin white. *Body* swarthy, forepart blackish and spotted with white; *antennæ* black. UNDERSIDE, olivaceous-fuscous. *Forewing* with the inner margin white, with the costal streak and white subapical spots as on upperside, with a series of much interrupted marginal dots, and one submarginal spot at the anal angle; one discal spot, one in the cell, and a discal band with an oily appearance. *Hindwing* with two submarginal series of white spots, the inner series short; an arched discal series of violet dots, and one dot in the cell. *Body* with the thorax black, spotted with white; *antennæ* black; *abdomen* swarthy, banded with white." (Butler, Proc. Zool. Soc. Lond., 1866, p. 277, n. 26.) Distant remarks (Rhop. Malay., p. 22). "Butler gives another species, *E. ægyptus*, as having been received from Singapore. That Singapore specimen, however, no longer remains in the National collection under that name, and was probably so recorded in error."

not lobed ; also in the absence of the flesh-coloured patch on the hindwing. The ochreous-white markings are also more prominent.

In Indian specimens on the *forewing* the spots of the submarginal row increase from the costa to the first median nervule, and the next interspace below contains two small adjoining spots ; the marginal series is also complete in many specimens to the apex. A male specimen taken by Mr. Otto Möller in the Sikkim tarai in August has the upperside of the forewing very perceptibly shot with blue ; the marginal rows of spots on both wings smaller, especially the submarginal series on the forewing, the spot below the third median nervule in that series being obsolete.

This species on the upperside bears a very close resemblance to *E. core*, except in outline of the forewing, and the flesh-coloured patch on the hindwing, which latter is concealed by the inner margin of the forewing. On the underside it may be readily distinguished by the absence of the spot in the cell of both wings, which are invariably present in *E. core*. The apex of the forewing is more acuminate, and the inner margin much more convex ; both wings are wider and more ample than in *E. core*.

Our collections contain specimens taken at Trevandrum in July by Mr. H. S. Fergusson, at Calicut in September, in the Wynaad by Mr. Rhodes Morgan, and from Bhadrachullum taken by Mr. W. T. Blanford. In the neighbourhood of Calcutta Mr. de Nicéville has found it common throughout the year. In Ceylon it has been "taken at Galle and Kandy by Captain Wade."

The figure shows the upperside of both sexes—the male on the left, the female on the right, from specimens in the Indian Museum, taken near Calcutta.

The next three species, *E. vestigiata*, *E. novaræ*, and *E. leucogonys*, and also *E. eunice* from Java, are closely allied. The true *E. eunice* inhabits Java, and, according to the original description, has only a submarginal row of violet spots, one subcostal, and one interno-median spot on the forewing ; the Continental race from Burma and Malacca, which is referred to as *E. vestigiata*, further differs from the Javan species in having, in addition, numerous spots on the disc of the forewing, and an incomplete marginal series from the hinder angles of both wings ; but the extent to which these markings are developed differs so greatly in individuals, even from the same locality, that the Continental race can hardly be separated with propriety. The Nicobar race agrees with the true *E. eunice* from Java in the absence of the marginal series from both wings, but it has the spots on the disc even more largely developed than in the Continental race. It is as yet a rare insect, and we have never seen a specimen, and it is possible that when more specimens have been observed, this race may also be found to vary as much as the Continental race does, in fact "Felder clearly defines this variability in his description ;" in the meantime, as the Nicobar form may be peculiar, we have retained it as distinct under the name *E. novaræ* given to it by Felder. All these races have the wings shot with brilliant blue in *both* sexes.

48. Euplœa vestigiata, Butler.

E. vestigiata, Butler, Proc. Zool. Soc. Lond., 1866, p. 288, n. 58, fig. i, *female* : *Calliplœa vestigiata*, Butler, Trans. Linn. Soc., Zoology, second series, vol. i, p. 535, n. 2 (1876) ; *Euplœa vestigiata*, Distant, Rhop. Malay., p. 26, pl. iii, fig. 6 *male*, 7 *female* (1882).

HABITAT : Upper Tenasserim, Penang, Malacca, Sumatra and Java.

EXPANSE : 3·5 to 3·9 inches.

DESCRIPTION : MALE : UPPERSIDE.—*Forewing* uniform velvety blackish-brown (scarcely perceptibly paler at hinder angle), shot throughout with deep but brilliant blue ; with a submarginal series of prominent violet spots, a subcostal spot above end of the cell, and a broad short streak of violet below the first median nervule. In one specimen the submarginal row is incomplete, only four spots being present on the apical half, but in all the other specimens examined the row is complete, and prominent as far as the first median nervule ; in addition to these markings some specimens show a few small round marginal dots towards the hinder angle, some have two short discal streaks below the discoidal nervules, some have a short streak

above the interno-median streak, and others have a short streak below it; all these spots and streaks being violet. *Hindwing* paler brown, suffused darker and slightly tinted with blue on and about the median nervule; the costal area hoary, a large ochreous patch about the subcostal nervure covering the upper half of the cell, and extending above it; a submarginal decreasing row of three or four violet spots from the costa (almost obsolete in one specimen), and a few marginal dots from anal angle; in one specimen the submarginal row is complete to anal angle. UNDERSIDE paler brown, with the spots paler violet, almost white. *Forewing* with the interno-median area cinereous, the streak of the upperside visible as a raised concolourous mark; a conspicuous broad oval whitish patch above the first median nervule, two discal streaks sometimes prominent, sometimes obsolete, a subcostal violet spot; the submarginal row much smaller than on upperside and partially obsolete in one specimen; and a marginal row of small prominent dots, usually complete, but partially obsolete, in one specimen. *Hindwing* with a decreasing submarginal row of round whitish spots from the costa to anal angle; and a corresponding row of rounded marginal dots from anal angle not quite reaching the apex. The usual basal white dots, but no spots on the disc of the hindwing, and none in the cell of either wing, on upper or underside. The FEMALE differs from the male on the UPPERSIDE in having the submarginal spots of the *forewing* prominently centred with white; also in having the inner margin straight, not bowed out as in the male, and on the *hindwing* in the absence of the subcostal ochreous patch. On the UNDERSIDE the *forewing* is similar, except that the internal cinereous area does not nearly reach the median nervule, and the raised sexual streak is absent; on the *hindwing* the marginal and submarginal spots are rather more prominent. One female, evidently aberrant, has a conspicuous geminate violet spot at end of the cell in the forewing.

Notwithstanding that Butler in his original description of this species * omits all mention of the brilliant blue shot, it is clear from Distant's description in his "Rhopalocera Malayana," written after examination of the type, that the species here described is *E. vestigiata*, Butler. Neither Butler nor Distant refer in their descriptions to *E. eunice*, Godart, from Java, of which the present species appears to us to be only the continental form. Distant remarks that *E. vestigiata* "appears to be a variable species [of this there can be no doubt], and is probably a race of the *E. novaræ*, Felder. Felder clearly defines this variability in his description; in fact, with the qualifications he there admits in the markings of several varieties, the Province Wellesley specimens might almost be considered as agreeing with some of his Nicobar types. This Malay form somewhat differs from Javan specimens of *E. vestigiata*, which Mr. Kirby was probably correct in considering a variety of Felder's species."

Numerous specimens of this species were taken by Captain C. H. E. Adamson, near Moulmein, on 12th June; and a single male was taken at the Maylachoung, by Captain C. T. Bingham, on the 24th September; but it is a rare Butterfly, and has not hitherto been recorded as occurring within Indian limits.

49. **Euplœa novaræ**, Felder.

E. novaræ, Felder, Verh. zool.-bot. Gesellsch. Wien, vol xii, p. 482, n. 108 (1862); Reise Nov., Lep., vol. ii, p. 317, n. 430, pl. xxxix, fig. 7 (1865), *male*.

HABITAT: Kar Nicobar.

EXPANSE: 4·1 inches.

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*Euplœa vestigiata, Butler. HABITAT; Malacca, Sumatra, Java EXPANSE; Male, 3·55; female 3·4 inches. DESCRIPTION: "*Forewing* above blackish-swarthy, the margin slightly rufous, with eight or nine submarginal spots, one costal spot, and a short internal discal streak, violet. *Hindwing* olivaceous-swarthy, deeper in the middle; with the costal margin whitish, with three subapical white spots; the MALE with a rather large subtriangular ochreous spot placed near the costa *Body* blackish-swarthy, spotted with white in front; the *antennæ* black. UNDERSIDE olivaceous, with the interior margin ochreous-white; in the MALE with six submarginal dots, nine marginal, and one rather large oval discal spot, white; one oval discal internal spot ashy; one small costal spot and two discal placed behind the cell, violet-white. *Forewing* of the FEMALE with nine submarginal spots, four subanal dots, two minute subapical dots, and one large oval discal spot, white; one costal spot violet-white. *Hindwing* with ten submarginal spots, and nine or ten anal marginal spots, white; two elongated discal lots between the subcostal nervules, violet-white. *Body*, with the thorax black, spotted with white, the abdomen shy-fuscous; the *antennæ* black." (Butler, Pro. Zool. Soc. Lond., 1866, p. 288, n. 58, fig. 1, *female*).

DESCRIPTION : "MALE, with the *cilia* marked with white. *Forewing* above blackish chestnut, deeply suffused with violet blue in certain lights, with a subcostal spot, two behind the cell (sometimes entirely wanting), three median elongated (the first sometimes wanting, the third minute, and the middle one large and powdered with white), and seven to nine others submarginal of different shapes, pale violet blue. *Hindwing* pale silky fuscous, towards the base almost as in the forewing, the anterior margin silky white, with two white spots, the surface with the usual shelly appearance ; two or three decreasing spots, violet encircled with swarthy. UNDERSIDE pale rufescent fuscous, with white basal spots. *Forewing*, with a subcostal spot, two beyond the cell, four large interior, a bent submarginal dot-shaped series often interrupted, and a marginal series of minute spots. *Hindwing*, with some very small external spots, and others before the hinder margin violet blue, more or less powdered with white, and ringed with swarthy. *Forewing*, with the internal area as usual. A beautiful local form of the Javan *E. eunice*." (*Felder*, l.c.)

This is a very rare insect, and we have never seen a specimen.

50. **Euploea leucogonys**, Butler.

Salpinx leucogonys, Butler, Trans. Linn. Soc. Lond., Zoology, second series, vol. i, p. 536, pl. lxviii, fig. 5 (1876), *female*.

HABITAT : Nepal (?) Assam (?) Malacca.

EXPANSE : 3·2 inches.

DESCRIPTION : FEMALE. "Nearly allied to *E. vestigiata*, Butler, but smaller ; the costa of *forewing* not so strongly arched, the outer margin slightly inarched in the centre ; the submarginal spot on second median nervule wanting ; the subcostal spot above the end of the cell much smaller, the spot on interno-median area widened into a notched blotch, all the spots lilac. *Hindwing* paler, only three lilacine whitish spots placed obliquely near apex ; no submarginal spots ; anal angle white. UNDERSIDE : *Forewing*, with only two or three submarginal and three or four marginal white dots. *Hindwing*, with no white blotches beyond the cell." (*Butler*, l.c.) The figure shews on the *hindwing* three white submarginal spots one in each interspace above the discoidal nervule ; and five large violet-white spots on the margin at the anal angle. Distant remarks (Rhop. Malay., p. 27, *note*) :—"Butler's figure is somewhat misleading, the marginal spots to hindwing having been enlarged and exaggerated by the artist compared with those on the type specimen in the British Museum which I have examined." Mr. Distant considers *E. leucogonys* as merely a small variety of *E. vestigiata*.

This also appears to be a rare insect, and we have never seen a specimen ; its occurrence in "Nepal and Assam" must be considered doubtful pending further evidence ; it belongs to a Malayan group.

51. **Euploea rhadamanthus**, Fabricius. (PLATE VII, FIG. 11 ♂ ♀).

Papilio rhadamanthus, Fabricius, Ent. Syst., vol. iii, pt. i, p. 42, n. 127 (1793) ; *Trepsichrois thoösa*, Hübner, Samml. Ex. Schmett. (1806-1824) ; *Danais alcidice* et *rhadamia*, Godart. Enc. Meth., vol. ix, p. 180, nn. 13, 14 (1819) ; *Salpinx rhadamanthus*, Moore, Proc. Zool. Soc. Lond., 1878, p 822.

HABITAT : Eastern Himalayas and Burma.

EXPANSE : 3·0 to 3·8 inches.

DESCRIPTION : MALE : *Forewing* black, tinged with brown at the base, and shot throughout with deep violet blue, brightest towards the exterior margin ; a broad bar of white from the costa almost to the median nervure, cut into four irregular parts by the black costal and subcostal nervures ; below this and outside the cell is a white spot of variable size between the second and third branches of the median nervure ; this spot is sometimes altogether wanting, and in some cases a second white spot appears between the first and second median nervules.

Below the first median nervule is an oval longitudinal violet spot; four submarginal spots near the apex, and a larger one between the first and second median nervules, violet, often white centred; a few minute marginal dots near the anal angle, also violet. *Hindwing* with four white streaks from the base below the cell, followed by a short white dash tipped with violet, a whitish patch near the base cut by the subcostal nervure; the rest of the costal area rather pale silky brown; the exterior half black, shot with deep violet blue. Two small violet spots just beyond the end of the cell, two submarginal spots beyond these, and two more near the anal angle, and a few minute marginal dots (sometimes entirely wanting) from anal angle, also violet. UNDERSIDE brown, markings similar to those of the upperside, but whiter. In the *forewing* the second spot below the white patch, which is usually wanting on the upperside, is large and conspicuous on the underside; the submarginal spots are white, and the marginal series, which are violet, are more complete than on the upperside, especially towards the apex. In the *hindwing*, the whitish subcostal patch is wanting, and in addition to the white streaks below the cell there are three white streaks in the cell, the upper one short, sometimes divided, the middle one longer and narrow, the lower the broadest and longest; a series of five streaks outside the cell.

The above description is taken from a large series of specimens collected in Upper Tenasserim, by Captain C. T. Bingham, and from a few collected in the Khasi hills by Mr. J. P. Cock. In specimens from Sikkim, in Colonel Lang's collection, the white markings are altogether larger and more prominent than in Burmese specimens. The Sikkim specimens also average a good deal larger; they are paler and browner, especially at the base of the forewing; the white spot outside the cell of forewing, between the second and third median nervules, which is small or wanting in Burman specimens, is large and prominent in those from Sikkim, giving a different character to the white band. The marginal blue spots at anal angle of *forewing* are more numerous, often as many as seven being present, while in Burman specimens usually only two are visible, and apparently four is the maximum. On the *hindwing* all the spots are larger, the submarginal series shows usually six from the anal angle instead of two, and the marginal series has eight or ten, while in Burman specimens these latter are often entirely wanting, always minute, and seldom if ever exceeding six in number.

The FEMALE is paler and brown, not black, and shot with blue only on the outer half; all the markings are larger, whiter, and more prominent. In the *hindwing* the cell has also three large white streaks in it, occupying almost the entire area; they are confluent in the specimen figured, leaving only interrupted black streaks between. On the UPPERSIDE the costal margin of the *hindwing* is broadly white; the marginal and submarginal spots on both wings are circled with violet, and on the UNDERSIDE some are white, some are violet. The sexual spot is of course wanting, though it is replaced in the Sikkim specimen figured by a pale streak of grey scales. A single female sent by Captain Bingham from the Thoungyeen forests in Tenasserim differs from Sikkim females precisely as in the males as far as the white markings are concerned, but in it the blue gloss is scarcely perceptible at all, instead of being brighter as from analogy it should have been.

E. rhadamanthus is very common in north-eastern India, from Sikkim to Tenasserim in hilly tracts at elevations of from 1,000 to 4,000 feet above the sea. In the Khasi hills it is on the wing in the late autumn. In Upper Tenasserim, Captain C. T. Bingham found it common between Meeawuddy and Kankarit in February, in the Thoungyeen forests in March and April, and in the Donat range in April. The single female specimen referred to above was taken in the Thoungyeen forests in the autumn. Mr. Wood-Mason took numerous males and three females in Cachar from April to August, and Dr. J. Anderson took males only in the Mergui archipelago in the cold weather.

The figure shows the upperside of the male and female from Sikkim specimens in the Indian Museum, Calcutta.

52. Euplœa diocletianus, Fabricius.

Papilio diocletianus, Fabricius, Ent. Syst., vol. iii, pt. i, p. 40, n. 118 (1793); *Danais diocletia*, Godart, Enc. Méth., vol. ix, p. 181, n. 16 (1819); *Calliplœa diocletianus*, Butler, Trans. Linn. Soc., Zoology, second series, vol. i, p. 535 (1876); *Euplœa diocletianus*, Distant, Rhop. Malay., p. 28, pl. iv, fig. 4 *male*, 5 *female* (1882).

HABITAT: (Nepal, Assam?), Penang, Malacca, Singapore, Siam, Java.

EXPANSE: ♂, 3·4; ♀, 3·1 inches (from Distant's figures).

DESCRIPTION: "Wings entire, black. *Forewing* with a white interrupted band. *Hindwing* with some white lines at the base, and a double row of spots of this colour on the margin. Of the size of *D. claudia* [=*Euplœa midamus*] to which it is closely allied; the underside of both wings resembles the upperside. *Forewing* black, with a white band formed of four large spots, one transverse line of four dots of this colour, and some dots equally white along the margin. *Hindwing* blackish brown, with some white longitudinal lines towards the base, and two rows of white spots along the margin. The head and thorax are of a deep black, with some white spots; the upperside of the abdomen is blackish, the underside ashy with some very black bands." (*Godart*, l. c.)

E. diocletianus has usually been considered as identical with *E. rhadamanthus*, but the absence of all mention of the conspicuous violet blue shot, the pure white character of the markings, and the black colour of the wings, seem to indicate its distinctness from that species in both sexes. We have never seen a specimen, and if it occurs at all in "Nepal and Assam" (which we doubt), it must be extremely rare. It is included in Butler's paper on the Butterflies of Malacca* as *Calliplœa diocletianus*. It is probably a local form of *E. rhadamanthus* developed in the Malay Peninsula. The Tenasserim female of *E. rhadamanthus* shows a decided approach to this species in colouration, but it is small, far smaller than average specimens of *E. midamus*. Distant remarks: "This is evidently a Malay race of *E. rhadamanthus*, a species which I follow Moore and Butler in considering as typically represented in Northern India. It possesses also another and very distinct Bornean race, described as *E. lowii*. The principal difference between these three species or races is that of a gradually increasing melanism, which is least in the North Indian *E. rhadamanthus*, and greatest in the Bornean form *E. lowii*." According to Distant's description the wings in this species are dark indigo-blue, not black.

Second group.—MACROPLŒA, *Butler.*—Mr. Butler has separated this group from the foregoing in the following terms:—"This genus [*Salpinx*, Hübner], is not altogether a satisfactory one; it contains two groups, the one being much like an enormous form of *Calliplœa* (I refer to the *S. phœnareta* group), the other having a blue or sericeous brand upon the interno-median area; in other respects the species seem nearly allied. I propose to give the first of these groups the subgeneric title of *Macroplœa*." (*Butler*, Journ. Linn. Soc., Zoology, vol. xiv, p. 292 (1878).

This subgroup is only represented by two species within Indian limits, of which one is found in Ceylon; the other, a native of the Malay peninsula, extends into Burma, and has been found in the Nicobar isles. The *Euplœas* of this type are large insects, without the brilliant purple or blue gloss, and usually with three more or less complete rows of marginal and submarginal spots. They differ from the *Salpinx* group only in having *no brand* on the interno-median area of the forewing of the male, and in their *large size*; the outer margin of the hindwing in the male too appears as if it had been oiled.

Key to the Indian species of Macroplœa.

A Upperside golden-fuscous; forewing with three rows of violet-white spots.

a. With the violet-white markings prominent; the three rows on forewing complete.

53. E. (*Macroplœa*) CASTLENAUI, Burma, Nicobars.

b. With the violet-white markings small; the discal series incomplete.

54 E (*Macroplœa*) ELISA, Ceylon.

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* Trans. Linn. Soc., Zoology, second series, vol. i, p. 535 (1876).

53. Euploea castelnaui, Felder.

E. castelnaui, Felder, Reise Nov., Lep., vol. ii, p. 315, n. 427 (1865), *female*; *E. phœbus*, Butler, Proc. Zool. Soc. Lond., 1866, p 270, n. 3; *Macroploea phœbus*, Butler, Journ. Linn. Soc., Zoology, vol. xiv, p. 292 (1878); *E. castelnaui*, Distant, Rhop. Malay., p. 24, pl. ii, fig. 6 (1882), *female*.

HABITAT: Tenasserim, Penang, Nicobars, Java.

EXPANSE: ♂, 4·5 to 5·3; ♀, 4·9 to 5.3 inches.

DESCRIPTION: "*Forewing* elongate. UPPERSIDE golden-fuscous, the costa fuscous, and the internal area fuscescent; the outer margin with three rows of white submarginal spots, and one spot near end of the cell; the external row composed of small oblong spots; the middle row with spots increasing in size near the costa, and arranged in a curved line; the inner row angulate, with oblong spots increasing in size near the costa. *Hindwing*, purpurescent, the costal area ochreous-white, and the middle of the cell ochreous [in the MALE], the external and internal areas rufous-swarthy. Of the FEMALE with three continuous rows of rufescent-white submarginal spots on the outer margin: of the MALE with three interrupted rows not reaching the anal angle, and the anal angle appears as if oiled. UNDERSIDE, *forewing*, fuscescent at base, purpurescent in the middle in certain positions; the inner margin pale, with a rather large white subanal spot; the outer margin with rows of spots as on the upperside, the two external rows, however, with smaller spots, and the inner row beyond the end of the cell sometimes obsolete, and of larger spots. *Hindwing*, coppery-fuscous, the outer margin in the MALE fuscescent, with a marginal row of white dots, and three subapical, and an arched series of five violet dots beyond the end of the cell; in the FEMALE with two rows of dots, an inner arched series of seven violet dots, and one near end of the cell. *Body* with the thorax black, spotted with ochreous; *abdomen* ashy; *antennæ* black. This species is quite distinct from *E. prothoë*, Godart, being much smaller, of a more golden colour, and quite differently spotted." (*Butler*, l. c.)

A female, taken by Captain C. H. E. Adamson at Nyounting, near Moulmein, in September, has the whole apical area of the forewing powdered with violescent-white, the two inner rows of spots above the third median nervule being almost lost in the ground-colour, which in that part is almost pure white; the spots on both wings are also larger, and more diffused. The inner margin of the forewing is straight, while in the male it is enormously lobed to cover the ochreous patch of scales on the hindwing, which is present in that sex though absent in the female. The female is altogether a much paler insect, especially on the underside, where all the markings are larger than in the male. The spots outside the cell on the underside of many males are eight in number, there being two short parallel streaks between the first median nervule and submedian nervure.

Mr. de Roepstorff has taken two male specimens in the Nicobars. Dr. J. Anderson took one male and seven females in January, also two females in Marcl., in the Mergui archipelago. These female examples are darker than the Moulmein specimen; the three series of spots on the forewing are also distinct, though exhibiting a tendency to coalesce.

54. Euploea elisa, Butler. (PLATE VIII, FIG. 14 ♂).

E. elisa, Butler, Proc. Zool. Soc. Lond., 1866, p. 270, n 4; *Macroploea elisa*, id., Journ Linn Soc, Zoology, vol. xiv, p. 292 (1878); id., Moore, Lep. Ceylon, p. 9. pl v, fig. 2, *male*, 2a, *female* (1880).

HABITAT: Ceylon.

EXPANSE: ♂, 4·25 to 4·80; ♀, 4·1 to 4·7 inches.

DESCRIPTION: "*Forewing* above golden-fuscous, the inner margin fuscescent, with three rows of white spots, the inner row short with three spots placed between the median nervules, the outer row not reaching the apex; the middle row in the MALE much interrupted, in the FEMALE continuous, curved near the costa; one spot near the end of the cell. *Hindwing* of the MALE coppery-fuscous, the costal area ochreous white, and the middle of the cell ochreous; with three discal spots placed beyond the cell; the outer margin fuscous; the anal margin as if oiled. Of the FEMALE the *hindwing* is golden-fuscous, with the costal margin pale; the outer margin with two submarginal series

of white dots, indistinct at the anal angle; and a series of three spots placed beyond the cell. *Body* swarthy, darker and white-spotted in front; the *antennæ* black. UNDERSIDE: *Forewing* as on upperside, but the spots are larger, and the external submarginal row is continuous in the MALE. *Hindwing*, of the MALE, paler; on the outer margin with a row of five marginal dots in the middle, and an angulate row of violet dots beyond the end of the cell; some minute white spots at the base. *Hindwing*, of the FEMALE, as on upperside, but the internal series beyond the end of the cell has six dots, and one near the end of the cell. *Body* with the thorax black, spotted with white; *abdomen* fuscous; *antennæ* black." (*Butler*, l. c.)

"LARVA* purple-brown, with two black-tipped red fleshy filaments on second, two on third, and two on twelfth segments; each segment with transverse black streaks; lateral line purple; head and legs black. PUPA thick, broad, purple-grey, fasciated with golden-yellow; abdominal segments black-beaded." (*Moore*, Lep. Ceylon, p. 10, 1880).

"Taken on low ground at Colombo among hedges round native gardens at any time, but not very common. Of slow heavy flight; settles on leaves, and is easily caught." (*Hutchison*). "Commonly found at Galle among cocoanut trees and low bushes." (*Wade*). There is as yet no record of its occurrence except in Ceylon.

The figure is taken from a male specimen from Ceylon in the collection of the Hon'ble F. Mackwood.

Third group.—CALLIPLŒA, *Butler.*—"The species of *Calliplœa* are all of small size; they have the inner border of the *forewing* in the *males*, strongly developed, and covering a large subcostal yellowish patch upon the *hindwing;* but *without any trace of a brand on the interno-median area* of the *forewing*." (*Butler*, Journ. Linn. Soc., Zoology, vol. xiv, p. 296, 1878).

Only one species of this group has been recorded from India; the exact locality is not stated, but probably it is from the north-eastern corner into which the Malayan fauna extends. It appears to be rare.

Key to the Indian species of Calliplœa.

A. Costal margin and apical half of *forewing* deep chestnut, shot with violet or blue.
  a. With the spots on *forewing* violet-silvery speckled with white; two cellular spots sometimes confluent.
    55. E. (*Calliplœa*) LEDERERI, Eastern India.

55. Euplœa lederері, Felder.

E. ledereri, Felder, Wien. Ent. Monatsch., vol. iv, p. 397, n. 14 (1860); id., Reise Nov., Lep., vol. ii, p. 317, n. 431, pl. xl, figs. 5, 6 (1865), *male; Euplœa inquinata*, Butler, Proc. Zool. Soc. Lond., 1866, p. 288, fig. 2, *male*, p. 291, n. 65; *E. ledereri*, Distant, Rhop. Malay., p. 26, pl. ii, fig. 10 (1882), *male*.

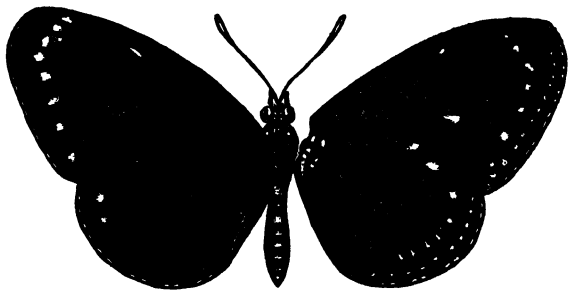
HABITAT: Eastern India, Malacca interior.

EXPANSE: 2·75 to 3 inches.

DESCRIPTION: "MALE.—With the *cilia* marked with white. UPPERSIDE dilute chestnut-swarthy. *Forewing* with the costal margin and anterior half spread with deep chestnut, and in certain positions shot with violet; with two cellular spots sometimes confluent, two subcostal, a third below the second discoidal nervule sometimes rather larger, a fourth rather large, subapical and trifid, and four submarginal, silvery violet more or less powdered with white. *Hindwing* with the border beyond the cell much paler, the costal area silky-hoary with two white spots; the usual discal patch shortened, and well separated from the origin of the discoidal nervure. UNDERSIDE, pale shining fuscous. *Forewing* with a subcostal spot, three discal, others external small, and marginal dots. *Hindwing* with external decreasing spots, and rather larger marginal dots, white." (*Felder*, l. c.)

* Figured on pl iv, fig 8; chrysalis, 8a, of Horsfield and Moore's Cat. Lep. E. I. C., vol. i (1857), from drawings of E. L. Layard, as the larva of *E. prothoë*.

This species, if it really does occur with Indian limits, is very rare; we have never seen a specimen. Distant remarks that "it appears to be almost confined to the Malay Peninsula, especially if there should be any error in the locality of Assam, as given by Mr. Warwick to the British Musuem." It is nearly allied to, and probably is only the continental form of, *Euplœa mazares*, Moore, from Java, of which a figure of the upper and underside of a male in the Indian Museum, Calcutta, is given below :—



EUPLŒA MAZARES, Moore.

Fourth Group.—TREPSICHROIS, *Hübner.*—"Forewing elongated, the outer margin subangulated and slightly inarched below the apex; the inner margin of the male very slightly convex, without trace of a brand, but the hindwing with a small yellowish patch in the cell at the origin of the first subcostal branch." (*Butler*, Journ. Linn. Soc., Zoology, vol. xiv, p. 296, 1878).

The elongated forewing distinguishes this group and the two following from the three which precede. Only a single species of this group is found within Indian limits, and only three others are known which represent the group in the Malay archipelago. The females differ greatly from the males in having the hindwing profusely striped with white. The Indian species extends from Burma through the Himalayas to Kulu, and is the widest spread and commonest of all the *Euplœas* of Northern India, except *E. core.*

Key to the Indian species of Trepsichrois.

A. Forewing velvety-brown, shot with bright blue, and with bluish-white spots on the outer half.

56. E. (*Trepsichrois*) MIDAMUS, N India, Burma.

56. Euplœa midamus, Linnæus. (PLATE VIII, FIG. 13 ♂ ♀).

Papilio midamus, Linnæus, Mus. Ulr., p. 251, n. 70 (1764); id., Syst. Nat, vol. i, part 2, p. 765, n. 108 (1767); *Papilio claudia*, Fabricius, Gen. Ins., p. 263 (1777), *female*; *Danais midama*, Godart, Enc. Méth., vol. ix, p. 179, n. 12 (1819); *Trepsichrois midamus*, Hübner, Verz. bek. Schmett., p. 16, n. 92 (1816); *Papilio basilissa*, Cramer, Pap. Ex., vol. iii, pl. cclxvi, fig. C (1780), *female*; *Euplœa midamus*, Distant, Rhop. Malay., p. 24, pl. ii, fig. 8 *male*, 9 *female* (1882).

HABITAT: N.-W. Himalayas to Burma.

EXPANSE: ♂, 3·0 to 4·2; ♀, 3·5 to 4·6 inches.

DESCRIPTION: MALE: UPPERSIDE, *forewing* deep velvety blackish-brown, glossed with brilliant blue, brightest on the apical half, where it forms in some lights a large patch of this colour. The basal half spotless, the outer half with numerous pale blue spots, powdered and often centred with white, and arranged as follows:—A marginal row of small spots, regular, two between each pair of nervules, decreasing towards and seldom reaching the apex; a submarginal row of larger spots, irregular, one between each pair of nervules; a discal row, very irregular, of seven spots, and angled at two points, commencing with a small costal spot, and ending with an oblong interno-median spot; and one spot in the cell near the end. *Hindwing* velvety brown, the costal area ashy testaceous, with a small yellowish patch within the cell at origin of first subcostal nervule, otherwise entirely unspotted, though occasionally

a faint trace of an obsolete marginal row is visible. There is also a large patch of lengthened, plush-like, modified scales somewhat lighter coloured than the ground, filling the upper and outer two-thirds of the cell, and extending beyond it almost to the outer margin, bounded posteriorly by the third median nervule and extending to above the first subscostal branch. This patch of scales, together with the small yellowish patch also within and nearer the base of the cell is peculiar to this group of *Euplœas*. UNDERSIDE, paler brown. *Forewing*, with the interno-marginal area broadly tinged with ashy, and showing a broad whitish streak near base, almost covered by the hindwing. Spots as on upperside, but violet-white, smaller, and the oblong interno-median spot which terminates the discal row is wanting on the underside. *Hindwing* with a marginal row of two spots between each pair of nervules, from anal angle not usually reaching the apex; a submarginal similar row from apex, incomplete towards the anal angle; a spot in the cell at the end, and three or four small streaks arranged outside it on the disc, violet-white; the *cilia* spotted with white on both wings.

The above description is from specimens from Shillong, which are of large size; the specimens from Upper Tenasserim are much smaller, and on the underside the spots are all smaller; many of them, especially on the hindwing, are completely wanting, and where present are very minute. In some Sikkim specimens also the spots are similarly small, and more or less wanting on the underside. On the underside of the *abdomen* there are six transverse bands of lilac-white in Shillong and Sikkim specimens, while in the Tenasserim specimens there are seldom more than three. FEMALE: Brown, darkest towards the apex of forewing, and much streaked with white, especially on the hindwing. *Forewing* with a large patch on outer half shot with bright blue; the spots as in the male, but except on the blue-shot patch the spots are pure white; from the base of the wing a faint brownish-white streak in the cell, and a longer and whiter streak (sometimes double) in the interno-median area, coalescing with the last spot of the discal series. *Hindwing* with a row of rounded marginal spots, a submarginal row of white streaks, two between each pair of nervules, short at the apex, but towards the anal angle extended right up to the base of the wing; a discal series longest at the costa, and three or four streaks in the cell, all white. UNDERSIDE as on upperside, but the streaks from base of *forewing* broader, more prominent and purer white; some of the spots and streaks on the outer half of both wings tinted faintly with blue. The specimens from Tenasserim, as do the males, average smaller in size than those from Shillong.

LARVA.—Ground-colour testaceous, marked with crimson and black perpendicular lines on the segments, a spiracular row of black spots and some yellow blotches just above the legs. The face is also marked with crimson and black; legs red; the third, fourth, fifth, and twelfth segments have each a pair of very long tentacula springing from the subdorsal region, and standing almost upright over the body; the lower portion of these processes is crimson, the upper black. Figure 10 of Plate IV, of Horsfield and Moore's Cat. Lep. E. I. C. (1857), from Java, where it "feeds on a species of *Ficus*, December." Also Plate III, fig. 10, caterpillar, and 10a, chrysalis, of Horsfield's Cat. Lep. E. I. C. (1829). PUPA, Figure 10a.—Castaneous, beautifully marked with gold.

E. midamus is, with the exception of *E. core*, the commonest and most widely spread of all the *Euplœas* of north India, but, except in the far east it is only found in the warm valleys of mountainous regions. It extends from Tenasserim as far west as Kulu, where Mr. A. Graham Young has taken a single specimen. Mr. de Nicéville also took a single worn female at Kalka, Punjab, in October. A single specimen was taken by Colonel Lang, at Sitapur, in Oudh, but its occurrence in the plains of Oudh must be very exceptional. In Kumaon it is found, but rarely, in the warm valleys in the rains. In Nepal it seems to be common near Khatmandu, as Dr. Scully brought down numerous specimens. Mr. de Nicéville has taken it commonly in the Sikkim tarai, and below Darjiling in the autumn. In the Khasi Hills it is common in the autumn and cold weather. Mr. Wood-Mason found it abundant in Cachar throughout the hot weather. Dr. J. Anderson also took numerous specimens in the Mergui archipelago throughout the cold months; and in Upper Tenasserim Captain Bingham found it common in the Thoungyeen forests in March and April.

Butler records *E. mulciber* as a distinct species, occurring with *E. midamus* at Malacca. Cramer's figure of *E. mulciber*, however, is almost identical with the common *E. midamus* of North-East India. *E. mulciber* is figured by Distant (Rhop. Malay., pl. iii, fig. 1 *male*, 2 *female* 1882), who never met with it in the Malay Peninsula, and remarks (page 26) that "it has been considered as the constant Bornean race or form of *E. midamus*, and peculiar to that island."

The figure shows the upperside of a male from the Khasi hills, and of a female from Sibsagar, Assam, both in the Indian Museum, Calcutta.

Fifth Group.—CRASTIA, *Hübner*?—"Males with more acuminate forewing than in *Trepsichrois*, the inner margin much more convex; no brand on the forewing, and no yellowish spot in the cell of the hindwing. Females similar to *Trepsichrois* in form." (*Butler*, Journ. Linn. Soc., Zoology, vol. xiv, p. 297, 1878).

This is a Malayan group; four species are recorded as occurring within Indian limits, one in the Nicobars, the others all in the extreme east on the borders of Malayana. All the species are comparatively rare within Indian limits, and we have no specific record of any being taken, except in Tenasserim and the Nicobars.

Key to the Indian species of Crastia.

A. With the wings above spotless black-fuscous, suffused with the deepest violet-blue, bordered externally with paler unglossed fuscous.

57. E *(Crastia)* SIMULATRIX, Nicobars.

B. Basal three-fourths of forewing glossed with blue; hindwing with two series of small whitish spots.

a. Rufescent swarthy; hindwing not blue glossed; spots small.

58. E. *(Crastia)* MODESTA, Burma.

E. *(Crastia)* CAMARALZEMAN, Siam.

b. Cupreous brown; hindwing blue glossed; spots larger.

59. E *(Crastia)* CUPREIPENNIS, Burma.

C. Wings blackish-swarthy, unglossed with blue; forewing with three more or less complete series of white spots.

60. E. *(Crastia)* BREMERI, Mergui.

E. *(Crastia)* MALAVICA, Malayana.

57. Euploea simulatrix, W.-M. and de N.

E. (Crastia) simulatrix, Wood-Mason and de Nicéville, Journ. A. S. B., vol. l, part ii, p. 229 (1881), *male*; idem, id., vol. li, p 15, pl. iii, fig. 1 *male*, 2 *female* (1882).

HABITAT: Great Nicobar.

EXPANSE: ♂, 3·7; ♀, 3·18 to 3·86 inches.

DESCRIPTION: "MALE: UPPERSIDE spotless black-fuscous, suffused with the deepest violet-blue, externally tolerably broadly bordered with paler unglossed fuscous. *Hindwing* with an oval patch of iridescent lighter modified scales, occupying about the second and third fifths of the length of the organ, extending from the middle of the discoidal cell to the middle of the interspace between the costal and subcostal nervures at its widest part, and bounded in front by an indistinct streak of cretaceous white; and with the space in front of this oval patch, and of the apical portion of the first subcostal branch, cinereous. UNDERSIDE lighter and less sombrely coloured, their dark basal portions being distinctly glossed with purple-violet, more broadly bordered with paler fuscous, and marked with prominent spots and streaks. *Forewing* with eight spots, *viz.*, a subapical series of three dots, the posterior of which is equal to the other two taken together, a somewhat elongated large spot between the first and second median nervules, nearly pure white; a reversed comma-shaped spot near the end of the cell, a rounded one and a short linear streak beyond it, the former between the second and third median nervules, and the latter between the third median nervule and the discoidal nervure, and a subcostal spot on a level with the end of the cell, bluish or violet white; with a streak pointed at both ends in the middle of the interno-median area, and, posterior to this, a similarly shaped

and placed patch divided by the submedian nervure, cretaceous-white; and with the sutural cell behind the whitey-brown patch cinereous and satiny. *Hindwing* with a submarginal series of minute violet-white dots, a cellular spot and a curvilinear series of six just outside it bluish white, in addition to the usual basal dots. FEMALE: Wings above and below all lighter and more broadly bordered externally with paler colour of much the same tint as in *E. camorta*. *Forewing* above with an increasing series of three subapical spots, an elongated subcostal spot, a minute dot near the end of the cell, and a larger one just beyond it near the base of the interspace between the second and third median nervules, all white. *Hindwing* above spotless. UNDERSIDE with the discal spots of *both wings*, and the subapical ones of the *forewing* larger and more prominent, but with the submarginal series of the *hindwing* incomplete and less distinct, there being only two speck-like representatives of them on one hindwing and three in the other, and with a short linear dash between the submedian nervure and the first median nervule, forming a seventh circumcellular mark; the spots all coloured as in the male. The second and smaller specimen approaches the male in the colour of the upperside, and in the breadth of the pale outer borders; it lacks the seventh circumcellular mark, and has only one indistinct representative of the submarginal series of dots on the underside of the hindwing."

"Appears to be very closely allied to the Javan *E. sepulchralis*, Butler."

"A single male and two female specimens from Great Nicobar. On the upperside, it very closely resembles *E. camorta*, of which it is in all probability a mimic, differing from that species, however, in its rather darker and more sombre hue, and in being devoid of a silky sexual streak, and on the underside in the presence of a submarginal series of dots in the posterior wing." (*Wood-Mason* and *de Nicéville*, l. c.)

58. Euplœa modesta, Butler.

E. modesta, Butler, Proc. Zool. Soc. Lond, 1866, p. 273, n. 13.

HABITAT: Tenasserim (?), Siam.

EXPANSE: 3·2 inches.

DESCRIPTION: "MALE: UPPERSIDE rufescent swarthy. *Forewing* with the basal area bluish. *Hindwing* with the costal area paler; a rather large fuscous subcostal spot, the outer margin with two rows of ochreous-white submarginal spots, the inner row with elongate spots not reaching the apex. *Body* rufous-swarthy, the head spotted with white. *Antennæ* black UNDERSIDE paler. *Forewing* with the outer portion of the internal area ochreous, and the margin broadly ashy; one discal spot, and two dots, one costal, and a spot at the end of the cell, bluish-white. *Hindwing* with submarginal spots as above, seven discal spots in an arched series, and a spot at the end of the cell, violet-white; some white dots at the base. *Body* with the thorax ashy, spotted with white; the abdomen swarthy with elongated ochreous median spots. *Antennæ* black." (*Butler*, l. c) FEMALE undescribed. See remarks on the following species, *E. cupreipennis*.

An allied species, *E. camaralzeman*,* Butler, is recorded from Siam.

59. Euplœa cupreipennis, Moore.

Crastia cupreipennis, Moore, Proc. Zool. Soc. Lond., 1878, p. 823.

HABITAT: Mergui, Upper Tenasserim.

EXPANSE: 3·13 to 3·60 inches.

DESCRIPTION: "Allied to *E. modesta* from Siam. UPPERSIDE cupreous-brown, the outer borders broadly paler. *Forewing* with the basal area blue-glossed. *Hindwing* with

* *E. camaralzeman*, Butler. HABITAT: Siam EXPANSE: 4·1 inches. DESCRIPTION: "MALE: UPPERSIDE blackish-swarthy. *Forewing* with the basal area shot with greenish-blue, one indistinct white spot below the end of the cell. *Hindwing*, with the costal margin paler, in the middle greenish-blue; with twelve ochreous-white marginal spots, and a submarginal anal series. *Body* blackish swarthy, anteriorly spotted with white; the *antennæ* black. UNDERSIDE olivaceous. *Forewing* with the basal area fuscescent and shot with greenish-blue; the internal area paler, and one dot at the end of the cell, and three minute anal spots, white. *Hindwing* with submarginal spots as on upperside, five discal spots, and one at end of cell, ochreous-white. *Body* with the thorax black, spotted with white; the abdomen swarthy, with blue median spots." (*Butler*, Proc Zool. Soc. Lond., 1866, p. 271. n. 6, pl. xxix, fig. 1, *male*).

the cell and contiguous area also blue-glossed. The two marginal series of spots larger." (*Moore*, l. c.) The FEMALE differs from the male in having the inner margin of the forewing straight, the apex more rounded, and the outer margin slightly convave; also in lacking on the hindwing the large pale fuscous subcostal patch, which, in the males, covers the anterior half of the cell.

Seven males and a single female have been sent to us by Captain C. T. Bingham from the Thoungyeen forests in Upper Tenasserim, the locality from which the type specimen of this species was taken by Limborg in 1876-77. Of these specimens one only has the forewing swarthy and scarcely perceptibly paler externally; all the others have the *forewing* rufescent-brown rather than "cupreous-brown," and with the outer margin broadly paler, and the basal three-fourths shot with bright blue; in all the cell and contiguous area of the *hindwing* is blue glossed; the two marginal series of spots on this wing are prominent and somewhat variable in size, and there can be little doubt that they all belong to the species separated as *E. cupreipennis* by Moore. No mention is made in the original descriptions of either this species or *E. modesta* of any spots on the upperside of the forewing; but in nearly all the specimens we have seen there are traces of white dots—in some a few marginal dots near the hinder angle, in others a more or less incomplete submarginal series, in others one or two on the disc outside the cell, or one in the cell, or one subcostal, but in all cases these dots, even when conspicuous, are small and so variable that no two specimens appear to exhibit them to precisely the same extent.

Dr. J. Anderson also took numerous specimens for the Indian Museum during the cold weather in the Mergui archipelago. They present precisely the same differences as are shown in the specimens taken by Captain Bingham. One pair have no spots whatever on the upperside of the forewing. The females of *E. cupreipennis* can be distinguished from the same sex of *E. margarita* by their smaller size, and the discal spots on the upperside of the forewing, when present, being pure white instead of violet. We have seen no specimens precisely answering to the description of *E. modesta*; but *E. cupreipennis*, if distinct, is evidently very closely allied to it, and it seems probable that both forms represent only a single species which should stand as *E. modesta*.

60. **Euploea bremeri**, Felder.

E. bremeri, Felder, Wein. Ent. Monatsch., vol. iv, p. 398, n. 16 (1860); id., Distant, Rhop. Malay., p. 23, pl. ii, fig. 4 (1882), *male*.

HABITAT: Mergui, Penang, Malacca, Singapore, Borneo, Sumatra.

EXPANSE: 2·9 to 3·9 inches.

DESCRIPTION: "MALE: UPPERSIDE blackish-swarthy, with a marginal series of white spots on both wings. *Forewing* with two or four discal spots, and eight outer spots (the fourth and fifth much larger), white. *Hindwing* with an outer row of white dots more or less obsolete. UNDERSIDE, both wings swarthy, with the outer and marginal spots as on upperside. *Forewing* whitish inwardly, with a costal spot, and four others discal (one in the cell). *Hindwing* with six or seven discal spots (one in the cell), white. Very nearly allied to *E. crameri** (*Lucas*, *Moore*), but differing in the presence of the marginal spots of the forewing, and the outer spots of the hindwing." (*Felder*, l.c.)

D. J. Anderson met with this species very commonly in the Mergui archipelago throughout the cold weather The males on the upperside of the forewing have usually four discal spots, one subcostal just above the extremity of the cell, one in the cell, and one in each of

* *E. crameri*, Lucas, Rev. Zool., 1853, p. 318. (Plate viii, fig. 15, *male*). HABITAT: Borneo. EXPANSE: 3·65 inches. DESCRIPTION: MALE: "UPPERSIDE wholly velvety blackish-brown, having a bluish tint, and slightly paler on exterior margins. *Forewing* with a short transverse row of six white spots from anterior margin, close to apex, the first two small, the third large and longest, the fourth the same size as the first, fifth and sixth very small; also a small spot near discoidal cell, between first and second median nervules *Hindwing* with two small white spots near anterior angle. UNDERSIDE, clear deep brown. *Forewing* with white spots as on upperside, also with three spots along costal margin, and some on the disc. *Hindwing*, with a submarginal row of small white spots, and some on the disc." (*Moore*, *Horsfield* and *Moore*, Cat. Lep. E. I. C., p. 129, n. 256 (1857).

The figure is taken from a male specimen from Borneo in the Indian Museum, Calcutta, and shows the upper and undersides.

the median interspaces; the spot in the cell and the spot in the lower median interspace are however sometimes wanting. The two marginal series of spots on the hindwing occasionally do not reach the anal angle. On the underside there are either two or three discal spots on the forewing, besides invariably one in the cell. The FEMALES are a little more variable; some have a spot in the cell of the forewing on the upperside, and two spots in the median interspaces; others have a complete series of five spots, one in each interspace, outside the cell, and two subcostal spots. The marginal series of dots are sometimes obsolescent towards the apex.

An allied species, E. *malayica* * is recorded from Penang, &c.

Sixth Group.—EUPLŒA, *Fabricius* (Restricted.)—"The species of this group are for the most part similar in form to those of the *Crastia* group; but the male has a more or less strongly defined longitudinal brand on the interno-median area of the *forewing*." (*Butler*, Journ. Linn. Soc., Zoology, vol. xiv, p. 299, 1878). The true *Euplœas* are the most widely spread of all the groups, and present the greatest variation in colour. There are fourteen species in the Indian region, and one or other species is found commonly in almost every part of India.

Key to the Indian species of Euplœa.

A. With the sexual brand short (under ·20 of an inch, except in *E. subdita* ·25), narrow, inconspicuous.

a. Velvety brown, with a more or less complete and conspicuous double row of whitish spots on the outer border of both wings.

a^1 Forewing with the spots of inner row at apex rounded.

61. E. CORK, India.

b^1 Forewing with the inner spots at apex large and elongate.

62. E VERMICULATA, N. India.

c^1 Forewing with the outer spots at apex obsolescent.

63. E. ASELA, Ceylon.

E. LAYARDI, Siam.

d^1 As in *E. core*, but with the basal area shot with blue, the spots smaller.

64. E. SUBDITA, Burma.

b. Deep swarthy, with border spots small and rounded.

a^1 *Hindwing* with inner row usually conspicuous.

65. E. ESPERI, Nicobars.

b^1 Hindwing with the inner row wanting.

66. E. FRAUENFELDII, Ceylon.

* *Crastia malayica*, Butler, Journ. Linn. Soc, Zoology, vol. xiv, p. 297 (1878); *Euplœa malayica*, Distant, Rhop. Malay., p. 22, pl. ii, fig. 7 (1882), *male*. HABITAT: Malacca, Penang, Singapore. EXPANSE: 4·6 inches DESCRIPTION: "Closely allied to *Crastia ochsenheimeri*, Moore, † but larger, considerably darker, and with the white spots much larger, both the submarginal series in the *hindwing* of the MALE complete; the FEMALE with a spot in the cell, followed by three complete series." (*Butler*, l.c.) "This is but a constant local race of *E. ochsenheimeri*, Moore, a species which Butler considers is probably the *E. gyllenhalii*, Lucas, and is apparently confined to Java. The Borneau form has also been separated, under the name *E. scudderi*. *E. malayica* is in itself variable, as in a second male specimen which I possess, the spots on the upper surface are much smaller, and the submarginal spots to the hindwing are very faint and obscure towards the anal angle." (*Distant*, l. c.)

† *Euplœa ochsenheimeri*, Moore. Horsfield and Moore, Cat. Lep E. I. C., vol. i, p. 132, n. 264 (1857). HABITAT: Java. EXPANSE: 3·75 inches. DESCRIPTION: "MALE: UPPERSIDE silky brown, darkest on the *hindwing*, and having a golden-greenish metallic lustre in some lights. *Forewing* with a submarginal row of small white spots (two between each nervule); two other parallel rows of somewhat larger spots (one between each nervule in each row); also one spot between first and second branches of subcostal vein, and one within the discoidal cell; narrow *cilia* between indentations spotted with white. *Hindwing* with two short rows of four very small white spots near anterior angle; narrow *cilia* spotted with white. UNDERSIDE as above, but the *hindwing* having the submarginal row of white spots continued along the whole margin; also a row outside discoidal cell; some white spots also at the base of the wings. FEMALE paler, the rows of white spots on UPPERSIDE of *forewing* disposed exactly the same, but are larger, those on the *hindwing* more straggling, and but few being distinct. UNDERSIDE as above, the *forewing* having also a longitudinal club-shaped streak between submedian and median nervures *Hindwing* with three rows of white spots, also one spot within discoidal cell, and some spots disposed at base of the wings. Shape of wings as in *Euplœa midamus*." (*Moore*, l.c.)

B. With the sexual brand short (·20 to ·30 in *E. andamanensis*, ·25 to ·35 in *E. godartii* and *E. camorta*), but conspicuous and rather broad.

a. Upperside with spots on the border.

*a*¹ Pale brown, darkest on external border.

67. E. ANDAMANENSIS, Andamans.

*b*¹ Rufescent brown ; apex of forewing broadly suffused with violet-white.

68. E. GODARTII, Burma.

b. Upperside with few or no spots on either wing, none on the outer margin.

*a*¹ Underside with two subapical spots on *forewing*, and five on the disc on *hindwing*.

69. E. SCHWARZERI, Ceylon.

*b*¹ Underside with no subapical spots on *forewing*, and six to seven on the disc on *hindwing*.

70. E. CAMORTA, Nicobars.

C. With the sexual brand long (·45 in *E. alcathoë*), and conspicuous ; the inner row of spots on *hindwing* narrow and very elongate.

a. *Forewing* velvety black, scarcely perceptibly glossed with violet ; both rows of spots on *hindwing* prominent.

71. E. ALCATHOË. N.-E. India, Burma.

b. *Forewing* shot with violet ; outer row of spots on *hindwing* obsolete.

72. E. MENETRIESII. N.-E. India ? Burma.

D. With the sexual brand long (·55 in *E. deione*, ·65 to ·75 in *E. limborgii*), very broad and conspicuous. Forewing splendidly shot with blue.

a. *Hindwing* with border spots obsolescent.

73. E. DEIONE, N.-E. India.

b. *Hindwing* with border spots prominent.

74. E. LIMBORGII, Burma.

E. PINWILLI, Malacca.

The first four species—*E. core*, *E. vermiculata*, *E. asela*, and *E. subdita*—are probably merely local races or subspecies of *E. core*. *E. subdita*, which represents the Burman form, is the most distinct of all, with its perceptible blue shot, and comparatively large sexual brand. *E. asela*, the Ceylon form, is distinct too as far as typical specimens from that island are concerned ; but the *E. core* of South India shows a very close approach to it, some specimens being indistinguishable from the Ceylon form. *E. vermiculata* of Northern India is more variable still, typical specimens are easily recognised, but the gradations between it and the typical *E. core* are so numerous that it is impossible to separate the two.

61. **Euploea core**, Cramer. (PLATE IX, FIG. 16♂ ♀).

Papilio core, Cramer, Pap. Ex., vol. iii, pl. CCLXVI, figs. E, F (1780) ; *Danais coreta*, Godart, Enc. Méth., vol. ix, p. 178, n. 6 (1819).

HABITAT : India generally.

EXPANSE : ♂, 3·0 to 4·0 ; ♀, 3·4 to 3·8 inches.

DESCRIPTION : UPPERSIDE rich dark velvety-brown, rather paler on the *hindwing*, and much paler on the margin, narrowly on *forewing*, more broadly on *hindwing* ; a double continuous series of white spots on the margin of *both wings*, those on the *hindwing* largest. The inner series is on the *forewing* continued prominently right up to the costa, one spot between each pair of nervules, rounded ; on the *hindwing* the spots above the third median nervule are as on the forewing ; below that nervule they are somewhat elongate-oval, and two between each pair of nervules. The outer series consists of two spots between each pair of nervules on *both wings*, decreasing towards the apex of *forewing*, where the uppermost are obsolete. A small internal silky streak on the forewing in the MALE. The FEMALE is paler than the male, is without the silky streak, has a straight inner margin to the *forewing*, and usually a white subcostal dot near upper end of cell in that wing, and one outside the cell between the first and second median branches in addition to the two series of marginal spots, which latter are

larger and more cloudy at the edges on the *forewing*. UNDERSIDE paler, darkest on the disc of the *forewing*, the marginal spots as above but more prominent and whiter. *Forewing* in both sexes, with a subcostal spot, three or four on the disc (one in the cell), and an internal streak, violet-white. *Hindwing* with a spot in the cell, and five on the disc round the end of the cell, violet-white; in the *male* the second of these spots is sometimes wanting: the usual basal spots.

Papilio corus (Fabricius, Ent. Syst., vol. iii, pt. i, p. 41, n. 122 (1793) is usually identified with this species, but according to the original description "*Danais cora* appears to differ from *D. coreta* (=*E. core*) only in having on the upperside four white dots on the middle of the *forewing*, and two similar ones in the middle of the *hindwing*." (*Godart*, Enc. Méth., vol. ix, p. 178, n. 7, 1819).

LARVA.—Above lilac, with three transverse darker lines on each segment, the spiracular region being ochreous, the abdominal region deep brown; with two tentacula on the second segment springing from the spiracular region one on each side and pointing forwards in front of the head; and two curled ones each on the third, sixth, and twelfth segments, springing from the subdorsal region. The spiracles have each a dark brown border. "Reared on *Nerium odorum*." (*Lang*). PUPA.—Smooth, rounded and fulvous, beautifully marked with silvery or golden dots and streaks. Figured on plate iv,, figs. 9, 9*a*, of Horsfield and Moore's Cat. Lep., E. I. C. (1857).

E. core is by far the commonest and most widely spread of all the *Euplœas*, being found in suitable localities throughout the continent. It does not appear to extend into Tenasserim, where it is replaced by the closely allied *E. subdita*. In the N.-W. Himalayas it occurs up to an elevation of about 8,000 feet, but is never common at this altitude.

The figure shows the upperside of a male and female from Calcutta specimens in the Indian Museum, Calcutta.

62. **Euploea vermiculata**, Butler.

E. vermiculata, Butler, Proc. Zool. Soc. Lond., 1866, p. 276, n. 24.

HABITAT: Northern India.

EXPANSE: 3·25 to 4·1 inches.

DESCRIPTION: "UPPERSIDE: *Forewing* swarthy, the outer margin paler; with nine submarginal spots, rather large at the apex, and marginal spots much smaller, white. *Hindwing* paler, fuscescent at base, with two submarginal rows of white spots, the inner row of large elongate spots. *Body* swarthy. *Head* black, dotted with white *Antennæ* black. UNDERSIDE, paler. *Forewing* with one costal spot, two discal, and one near end of cell, white; submarginal rows as on upperside, but larger. *Hindwing* with submarginal spots near apex and anal angle coalescent; otherwise as on upperside; five discal spots in an angulate row beyond the cell, and one near end of cell. This species appears to be allied to *E. core*, of which it may possibly be the northern form; it differs from it chiefly in having the submarginal spots exceedingly large and distinct, especially near the apex." (*Butler*, l. c.).

We retain this species on Butler's authority, but it does not seem a satisfactory one. The *E. core* of north India approaches the *E. vermiculata* type in precisely the same way as the *E. core* of extreme south India approaches the *E. asela* type. A few picked specimens of *E. vermiculata* taken separately, appear very distinct, but the type is not constant even in the same locality. In a large series collected at Najashahr, in the Saharanpur district, by Mrs. Deane, there were several specimens of typical *E. vermiculata*, male and female, several of typical *E. core*, and numerous intermediate forms.

63. **Euploea asela**, Moore.

E. asela, Moore, Ann. and Mag Nat. Hist, fourth series, vol. xx, p. 45 (1877); id., Lep. Ceylon, p. 11, pl. vi, fig. 2, *imago*, 2*a*, *caterpillar* and *chrysalis* (1880).

HABITAT: Ceylon.

EXPANSE: 3·25 to 3·80 inches.

DESCRIPTION: "MALE and FEMALE. UPPERSIDE dark velvety olive-brown, broadly paler externally. *Forewing* with a submarginal and less distinct lower marginal row of small brownish-white spots, the former series curving to the costa before the apex. MALE with a single short slender sericeous streak between the first median nervule and submedian nervure. *Hindwing* with a submarginal row of brownish-white oval spots, and a marginal row of smaller round spots. UNDERSIDE paler, both rows of marginal spots clearer; both wings with a small spot at end of the cell, and a contiguous discal curved series of spots. *Body* blackish; thorax, head, palpi, forelegs and abdomen beneath white spotted; middle and hindlegs beneath white streaked."

"LARVA cylindrical, purple-white or dove-colour, with a pair of curled red fleshy filaments on three of the anterior segments, and a pair on the twelfth segment; each segment transversely barred with narrow white lines, lateral band pinkish-white with black and red dots; abdominal line black; head and legs black, streaked with white. Feeds on *Nerium oleander*, &c. PUPA golden yellow, constricted below the thorax, streaked and banded with brown; dorsal segments black spotted." (*Moore*, Lep. Cey.)

In Ceylon "found everywhere, in the plains and up to 6,000 feet, in forest or open ground. At Colombo it occurs from October to January; elsewhere all the year. Flight slow, heavy. Often comes into the house in numbers, sometimes settling on one's clothes." (*Hutchison*). The typical form is found in the island of Ceylon, but specimens from south India approach this form very closely, just as in the parallel case of *Danais grammica* and *D. ceylanica*. *E. asela* is apparently only a geographical variety of the Indian *E. core*.

In Siam another species, *E. layardi*,* occurs, which appears to be closely allied to this group: it seems to differ only from *E. asela* in having a subcostal spot above the upper end of the cell, and another spot below the lower end of the cell in the second median interspace.

64. **Euploea subdita**, Moore.

E. subdita, Moore, Proc. Zool. Soc. Lond., 1878, p. 823.

HABITAT: Akyab, Upper Tenasserim.

EXPANSE: ♂, 3·13 to 3·90; ♀, 3·70 inches.

DESCRIPTION: "Allied to *E. core*. MALE: UPPERSIDE paler, markings similar, smaller and paler. *Forewing*, shorter, broader, and the posterior margin more convex; basal area slightly blue-glossed; markings indistinct." (*Moore*, l. c.) The FEMALE differs from the same sex of *E. core* in being paler, the submarginal row of spots on the *forewing* reduced to two at the apex, and three at the posterior angle, these spots all very small; the marginal series reduced to five, which are confined towards the posterior angle of the wing. Both series of spots on the *hindwing* are also smaller.

The male of this species can at once be distinguished from *E. core* by the perceptible blue gloss of the forewing, and the female by the two series of spots on the forewing being, compared with *E. core*, almost obsolete.

The Indian Museum has two specimens, male and female, taken by Mr. Wood-Mason, at Akyab, in September.

The next two species, *E. esperi* and *E. frauenfeldii*, are closely allied, but as in the parallel cases of *E. camorta* and *E. schenzvi*, and of *Danais nicobarica* and *D. exprompta*, the local races are separable; the Ceylon species *E. frauenfeldii* differing from the Nicobar form chiefly in the almost complete absence of the inner marginal row of spots on the hindwing, and the fainter development of the outer row. *E. frauenfeldii* is very rare, and the female is

* *E. layardi*, Druce. HABITAT: Chentaboom, Siam. EXPANSE: 4 inches. DESCRIPTION: "UPPERSIDE, brown, paler round the outer margin. *Forewing*, with two whitish spots at the end of [outside] the cell, and a double row of white spots round the outer margin. *Hindwing* with a band of oval-shaped white spots crossing it from the anal angle to the anterior margin, and a submarginal row of small white spots. UNDERSIDE as above, except that all the white spots are plainer." (Druce, Proc. Zool. Soc. Lond., 1874, p. 103, n. 9, pl. xvi, fig 1).

still unknown. *E. esperi* has recently been discovered to be far from uncommon in the Nicobar isles, and as might be expected the extent to which the spots of both wings are developed is found to be very variable. In one male specimen from Pulo Kondol in the Indian Museum, Calcutta, the hindwing has only a single marginal series of dots. Both species differ from the *E. core* type in the much darker colour of the surface, and the small size of the white spots, also in the presence of discal spots on the upper surface, which are absent from all the races of *E. core* except *E. layardi*.

65. **Euplœa esperi,** Felder.

E. esperi, Felder, Verh. zool.-bot. Gesellsch Wien, vol. xii, p. 482, n. 109 (1862), *female*; *E. frauenfeldii*, id., Reise Nov., Lep., vol. ii, p. 342, n. 474 (1865), *female*; *E. esperi*, Moore, Proc. Zool. Soc. Lond., 1877, p. 582; id., Wood-Mason and de Nicéville, Journ. A. S. B., vol. l, pt. ii, p. 227 (1881).

HABITAT: Nicobars.

EXPANSE: 3·4 to 3·8 inches.

DESCRIPTION: "FEMALE—Wings paler [than in *E. frauenfeldii*], with the discal spots of the underside shewing through above. *Forewing* with a subcostal spot, three discal (one in the cell), seven others external in a bent series, the two uppermost excepted, rather large (the third larger), and dots before the margin (the uppermost evanescent). *Hindwing* with the external spots small and elongate, and rather large dots before the margin swarthy, powdered with white. UNDERSIDE with the marginal spots of the upperside whiter. *Forewing* with two subcostal spots, below the second beyond the disco-cellular nervule a pair of elongate spots, narrow, a cellular spot, sinuate within, a pair median, a prolonged interior spot and a streak below that. *Hindwing* with a spot in the cell, often geminate, and six around it (the second larger), violet-white." (*Felder*, l. c. in Reise Nov.)

MALE swarthy black, markings on the UPPERSIDE similar to those of the female, but with the usual sexual mark, and the inner margin of *forewing* convex On the UNDERSIDE the markings are also similar, but several of the discal spots of the *forewing* are obsolete or wanting.

This species has as yet only been taken in the Nicobars, where it is one of the commonest Butterflies.

66. **Euplœa frauenfeldii,** Felder.

E. frauenfeldii, Felder, Verh. zool.-bot Gesellsch. Wien, vol. xii, p 479, n. 87 (1862), *male*, from Ceylon; Reise Nov. Lep., vol ii, p. 342, n. 474, *male, female*, pl. xli, fig. 4, *male* (1865); *E. frauenfeldi*, Moore, Lep. Cey., p. 12 (1880).

HABITAT: Ceylon.

EXPANSE: ♂, 3·6 inches, (Felder's plate), 4 inches *(Moore)*.

DESCRIPTION: "MALE: UPPERSIDE deep rufescent swarthy. *Hindwing* a little paler on the margin, the anterior area powdery, and with a somewhat pearly streak as usual. *Forewing* with a subcostal spot, another discal, five on the outer margin near apex (the second elongate), and dots before the lower outer margin. *Hindwing* with white dots before the margin in a bent series. *Forewing* with a cellular spot, and a pair of median spots showing through from the underside, powdered with white. UNDERSIDE paler, the usual basal dots, the spots of the upperside but whiter. *Forewing* with a geminate spot in the cell in addition, another short sublinear, and beyond that a third median somewhat large. *Hindwing* with a small spot in the cell, and five others in an angulate series around it decreasing, unequal, violet-white. *Forewing* with an interior raised spot powdered with hoary, and an internal streak somewhat pearly. *Hindwing* with a minute geminate white spot above the middle of the outer margin." (*Felder*, l. c. in Reise Nov.)

FEMALE unknown. In the "Reise Novara" Felder unites his *E. esperi* with this species, describing *E. esperi*, ♀, as the female of *E. frauenfeldii*, and giving Ceylon as the sole habitat for the species; but numerous specimens of the male of *E. esperi* from the Nicobars, hitherto undescribed, are in the Indian Museum, Calcutta. *E. frauenfeldii* is known only from Ceylon, where it is evidently very rare; we have never seen a specimen.

Moore, in the Lepidoptera of Ceylon (p. 12), gives the following description of the male of this rare species, which differs somewhat from the original description by Felder quoted above :—" UPPERSIDE blackish purple-brown. *Forewing* blue glossed, a very small white costal spot above end of the cell, a spot between third and second median nervules, a submarginal series of spots curving from apex, and a lower marginal series of smaller spots, a slender short sericeous streak below the first median nervule. *Hindwing* unmarked, except that it indistinctly shows a submarginal and marginal series of pale brown spots. UNDERSIDE dark olive-brown. *Forewing* with a bluish costal spot, a spot at lower end of the cell, a spot between the third and second median nervules, and a larger elongated white spot below it, the sexual streak and posterior [inner ?] margin being brownish white ; submarginal and marginal spots as above. *Hindwing* with a minute bluish spot at end of the cell, and a contiguous discal series of spots, a marginal series of small white spots, and a submarginal anal series of three or four spots. *Body* black ; head, thorax, palpi and abdomen beneath white spotted ; legs black. Expanse, 4 inches. Taken at Trincomalee on the north-east side of the island."

67. **Euplœa andamanensis**, Atkinson.

E. andamanensis, Atkinson, Proc. Zool. Soc. Lond., 1873, p. 736, n. 2, pl. lxiii, fig. 2, *male*.

HABITAT : Port Blair, Andaman Isles.

EXPANSE : 3·12 to 4 inches.

DESCRIPTION : " Pale fuliginous with white spots. *Forewing* with a white spot between the extremity of the cell and the costa ; another within the cell near its extremity ; two others below the cell, one between the first and second, the other between the second and third median nervules ; beyond these a curved series of nine white spots from the anterior margin to below the exterior angle, of which the three last are the largest ; followed by a submarginal series of smaller elongated spots, extending from the first discoidal nervule to the exterior angle. The interior margin much rounded in the MALE, in which sex there is a single vitta of dark adpressed scales between the first median nervule and the submedian nervure. In the FEMALE the vitta is replaced by a white streak. *Hindwing* with two somewhat irregular series of elongated white spots, corresponding to the two series in the forewing." (*Atkinson*, l. c) UNDERSIDE as on upperside, but on the *forewing* the inner discal series of spots is often complete right up to the costa, the lowest spot largest and round, the second also round, but smaller, the four upper ones linear and small. In many specimens some or all of these four latter spots are wanting. On the *hindwing* there is a large, sometimes geminate, spot in the cell, and six irregular discal spots round the end of it in addition to the border rows as on upperside. The discal spots occasionally show faintly by transparency on the upperside also. FEMALE as in the male, except that on the UPPERSIDE in the *forewing*, the sexual streak is replaced by a white rather elongated spot, and the inner margin is nearly straight, not outwardly lobed. On the *hindwing*, the spot in the cell and the six discal spots are faintly present on the upperside, as well as the border rows of spots. UNDERSIDE as in male.

E. andamanensis is a very distinct species ; it is common at Port Blair from March to August, and possibly at other seasons. The original description by Atkinson quoted above has been supplemented and completed from a large series collected by Colonel T. Cadell, V.C., Chief Commissioner of the Andamans, and by Mr. F. A. de Roepstorff, Deputy Commissioner. A marked feature of this species is that the ground-colour is darkest at the outer border instead of at the base of the wings, as is usual in this group. It has only been found as yet in the Andaman islands.

68. **Euplœa godartii**, Lucas.

E. godartii, Lucas, Rev. Zool., 1853, p. 319 ; *E. siamensis*, Felder, Reise Nov., Lep., vol. ii, p. 341, n 473, pl. xli, fig 6 (1865), *male*.

HABITAT : Burma.

EXPANSE : ♂, 3·0 to 4·2 ; ♀, 3·2 to 4·0 inches.

DESCRIPTION: "Wings above fuscous, paling on the outer margin. *Forewing* with the apex widely tinted with rosy violet, and white dots as in *E. alcathoë*. *Hindwing* as in *E. core*. UNDERSIDE as in *E. core*, but with the discal spots larger." (*Lucas*, l. c.)

The above is the original description by Lucas, which is hardly sufficiently full. The UPPERSIDE is more brown than swarthy, dark and velvety on the basal half, the outer border broadly paler, and somewhat rufescent. On the *forewing* the violet apical patch, which is formed by a powdering of the spaces between the nervules, varies much both in extent and intensity; in some it extends from the costal margin to the first median nervule, and almost to the end of the cell; in others it is almost entirely absent. The spots too vary very much; the full complement is one subcostal spot, one at end of cell, two on the disc, a few marginal, a few submarginal, and three subapical, the latter being circled with dark brown, and sometimes very prominent; but some of these spots are more or less obsolete in every specimen, and in some they are almost entirely wanting. In the MALE also there is a single small interno-median silky streak, and the inner margin is somewhat convex; in the FEMALE the silky streak is wanting, and the inner margin is nearly straight. *Hindwing* marked with two series of spots on the margin, as in *E. core*, but the spots are smaller, especially the inner series, and more or less sullied with brown. The costal margin is whitish, with a white subcostal spot. UNDERSIDE paler brown, darkest on the disc of the forewing. *Forewing* with the internal margin whitish, and an indistinct whitish streak on the interno-median area; a subcostal spot, a spot at end of the cell, one or two on the disc, and an elongate oval median spot below, violet-white; a few marginal spots near anal angle, three subapical, very variable in size, sometimes absent, and a few posterior ones sometimes wanting in a submarginal series, pure white. *Hindwing* with a spot in the cell, and five or six round the end of it, discal, violet-white; the two marginal series of spots as on upperside, but more prominent and pure white. The usual basal spots. In the FEMALE the median spot on *forewing* is rounded, not elongate-oval, otherwise the markings are similar.

In a female specimen, taken by Captain C. H. E. Adamson, at Moulmein, in September, the submarginal series of spots on the *forewing* is complete, those below the third median nervule being large, pure white and very prominent.

E. godartii is a very distinct species, with its violet powdered apical patch. It appears to be common in Burma from February to July. It was found by Captain Bingham in the Meplay valley in February, and in the upper Thoungyeen forests in April. By Limborg it was found in upper Tenasserim, also at Ahsown, Moulmein to Meetan, Hatsiega, Houngduran, and Naththoung to Paboga. In Rangoon it is common in June, July, and September, probably throughout the year. Dr. J. Anderson found it abundantly in the Mergui archipelago during the winter.

69. **Euplœa scherzeri**, Felder.

E scherzeri, Felder, Verh. zool.-bot Gesellsch Wien, vol. xii, p. 479, n. 88 (1862); id., Reise Nov., Lep., vol. ii, p. 335, n. 463 (1865); id., Moore, Lep. Cey., p. 12 (1880).

HABITAT: Ceylon, Java.

EXPANSE: 3·5 inches (*Moore*).

DESCRIPTION: "MALE: UPPERSIDE deep swarthy, much paler and brownish on the outer margin. *Forewing* with a single short velvety streak in the interior. UNDERSIDE: Both wings concolorous, but a little paler. *Forewing* with two internal whitish streaks (the upper one narrow, linear); a spot and two dots discal, a spot below the middle of the costa, and two subapical, bluish-white. *Hindwing* with five very small discal spots (one in the cell), bluish-white." (*Felder*, l. c. in Verh. zool.-bot. Gesellsch. Wien.)

This species is unknown to us. It seems to be closely allied to *E. camorta* from the Nicobars. It has never been figured, but Moore gives the following detailed description in his Lepidoptera of Ceylon:—"MALE: UPPERSIDE purplish olive-brown, darkest on basal area. *Forewing* with a minute white subapical spot, and a lengthened sericeous streak between first median nervule and submedian nervure. *Hindwing* with a subapical series of three small

very indistinct pale brown spots. UNDERSIDE paler. *Forewing* with a bluish-white small costal spot, one at lower end of the cell, two beyond, and an elongated lower spot, three or four submarginal spots below the apex. *Hindwing* with a small bluish-white spot at lower end of the cell, a contiguous discal series, three upper submarginal spots and a marginal lower series of spots. *Body* black; head, thorax, palpi and abdomen beneath white spotted; legs black. Expanse, 3·5 inches." The female has never been described.

70. **Euplœa camorta,** Moore.

E. camorta, Moore, Proc. Zool. Soc. Lond, 1877, p. 582; id., Wood-Mason and de Nicéville, Journ. A. S. B., vol. l, pt. ii, p. 228 (1881).

HABITAT: Nicobars.

EXPANSE: ♂, 3·5 to 4·2; ♀, 3·6 to 4·1 inches.

DESCRIPTION: "MALE: UPPERSIDE: Both wings dark blackish olive-brown, paler on the outer margins. *Forewing* with a short straight narrow silky streak between the first median nervule and submedian nervure. *Hindwing* with the anterior border broadly cinereous, the upper part of the cell being slightly greyish-brown. UNDERSIDE paler. *Forewing* with four bluish-white spots, one being on the costa above the end of the cell, another at its lower end, the other two outside; the sexual streak long, narrow, and patch on hind margin pale flesh-colour. *Hindwing* with seven median bluish-white spots." (*Moore*, l. c.) The FEMALE differs from the male in the outer margin of *both wings* being paler, the inner margin of the *forewing* is straight instead of convex, and in the absence of the sexual mark. In addition there is usually a conspicuous violet-white subcostal spot above the end of the cell, and one outside the cell below the third median nervule.

E. camorta, with its conspicuous broad pale margin to both wings, is a very distinct form, having no Indian allies, except apparently *E. scherzeri* from Ceylon. Some specimens show a few spots on the disc on the upperside. It has only been found as yet in the Nicobars, where it is very commonly met with, occurring probably all the year round.

The next two species, *E. alcathoë* and *E. menetriesii*, may be distinguished by the very elongate submarginal spots on the hindwing, which gradually lengthen from the apex to the inner margin, at which point they extend nearly to the base of the wing. They are found only in north-east India and Malayana. In these and in the two remaining species, *E. deione* and *E. limborgii*, the forewing is of a more elongate-ovate form than in any of the preceding species.

71. **Euplœa alcathoë,** Godart. (PLATE IX, FIG. 17 ♂ ♀).

Danais alcathoë, Godart, Enc. Méth., vol. ix, p. 178, n. 5 (1819); *E. doubledayi*, Felder, Reise Nov., Lep., vol. ii, p. 337, n. 467 (1865).

HABITAT: Sikkim, Sylhet, Assam, Naga Hills, Cachar, Mergui, Upper Tenasserim.

EXPANSE: 3·2 to 4·2 inches.

DESCRIPTION: "UPPERSIDE: *Forewing* deep chestnut swarthy, in certain positions slightly suffused with violet, paler at the inner margin: with an internal short and narrow silky streak, and minute white dots before the outer margin. *Hindwing* less intense in colour, much paler towards the margin: with a pearly costal dot, and the anterior area concealed with raised scales, giving the usual powdery appearance; a row of external greatly increasing spots radiate on the inner margin; and others before the margin, slightly elongate, increasing, white, powdered with brown; the lowest of the inner row confluent with the corresponding marginal ones. UNDERSIDE, much paler; the usual basal dots. *Forewing*, darker in the disc, a subcostal spot, and two in the disc (one in the cell), violet-white; an elongate median spot, three subapical, two posterior minute, and a few small dots before the outer margin, white; the internal margin hoary, with an elevated spot and pearly streak, as usual, concealed. *Hindwing* with a spot in the cell, and others very minute around it, violet-white; the marginal spots as on upperside, but longer and whiter. FEMALE, wings much paler. UPPERSIDE: *Forewing* with a subcostal

spot, and three discal (one in the cell), violet-white; two or three posterior spots, a few dots before the outer margin, and often with two minute subapical spots, white. *Hindwing* with the costal margin hoary-white, the spots as in the male, but the interior ones longer. UNDERSIDE almost as in the male, but the discal spots, and the posterior spots of the *forewing*, much larger. *Forewing* with an interior much elongated spot, violet-white." (*Felder*, l. c.)

The above description is taken from Felder's description of *E. doubledayi*, which was redescribed as distinct on account of Godart's original description of *E. alcathoë* purporting to be from an Amboyna specimen; but there is no doubt that Godart's locality was incorrect, and the name *E. alcathoë* will stand for this species. The male of *E. alcathoë* is a very black insect, the violet suffusion being scarcely perceptible; and, in the female especially, the very elongated narrow submarginal streaks form a conspicuous distinctive character. On the underside of the forewing of the male the three subapical spots, two minute posterior ones, and the few small dots before the outer margin referred to in the description above, are entirely absent in some specimens, and more or less so in others.

E. alcathoë was found by Limborg in Upper Tenasserim at Ahsown, at 2,000 feet elevation, and Captain C. H. E. Adamson has sent a single male specimen from Moulmein; it has also been taken by Captain Bingham, who has been collecting over the same ground. In Sikkim and Sylhet it appears to be not uncommon. At Shillong a single female specimen was taken in May by the late Mr. J. P. Cock. In this specimen the marginal dots of the forewing are almost obsolete, and the submarginal series is nearly complete, the lowest spot being much the larger. Mr. Wood-Mason found it in profusion in Cachar during the summer. Dr. J. Anderson sent numerous specimens to the Indian Museum, Calcutta, collected during the winter, in the Mergui archipelago.

The figure shews the upperside of a male and female from Sylhet specimens in the Indian Museum, Calcutta.

72. Euplœa menetriesii, Felder.

E. menetriesii, Felder, Wein. Ent. Monatsch., vol. iv, p. 398, n. 15 (1860).

HABITAT: Nepal, Assam (*Butler*), Malacca (*Felder*), Siam, Borneo.

EXPANSE: (Not stated).

DESCRIPTION: "Wings elongate. *Forewing* of the MALE with the inner margin rather convex. UPPERSIDE deep blackish swarthy, in certain positions shining with violet, with a rather broad velvety internal streak. *Forewing* of the FEMALE obscure brown. *Hindwing* in both sexes brown; on the UPPERSIDE with elongate external spots, and obsolete marginal spots, white; on the UNDERSIDE with the spots of the upperside white, distinct; and seven others discal (one in the cell), violet-tinted. Approaches *E. alcathoë*, but the wings are elongate, the form of the velvety stripe in the male, and the markings in the female, are different." (*Felder*, l. c.)

This species is unknown to us. In all probability the localities "Nepal, Assam" are erroneous, and if found within Indian limits it is most likely to occur in Tenasserim. The description of the male of this species accords closely with that of *E. limborgii*, but it is stated that it is allied to *E. alcathoë*, and the female is, as in *E. alcathoë*, obscure brown, whereas in *E. limborgii* the female is coloured similarly to the male and equally shot with splendid blue.

The next two species are distinguished from all other true *Euplœas* by the almost (generally quite) spotless velvety blackish forewing, splendidly shot with blue, except perhaps from the foregoing, *E. menetriesii*, which is said to have the forewing equally spotless and shining with violet. In *E. deione* from Assam the hindwing is spotless also, or nearly so; in *E. limborgii* from Tenasserim the hindwing has a conspicuous double row of white border spots, the inner somewhat elongate; and in *E. menetriesii*, which also has these border spots, the inner row is said to be elongate, "approaching *E. alcathoë*," which *E. limborgii* can hardly be said to do.

73. Euploea deione, Westwood.

E. deione, Westwood, Cab. Or. Ent., p. 76, pl. xxxvii, fig. 3 (1848), *male*; *E. poeyi*, Felder, Reise Nov., Lep., vol. ii, p. 340, n. 471 (1867), *female*.

HABITAT: Sikkim, Naga Hills, Assam.

EXPANSE: 3·6 to 4·4 inches.

DESCRIPTION: UPPERSIDE: MALE, black (or deep swarthy, with a slight rufous tinge on forewing, highly rufescent on hindwing). *Forewing*, in certain positions splendidly glossed with blue, having two small white spots, one near the middle of the wing, below the third median nervule, and the other near the middle of the costa above the end of the cell; a large and conspicuous silky brown streak runs parallel to the inner margin near the first branch of the median nervure. *Hindwing* unspotted (but in some specimens an obsolete marginal and submarginal row of small spots is distinctly traceable). UNDERSIDE, both wings brown, outwardly paler. *Forewing* with a few minute white spots at the base. A subcostal spot just above the end of the cell, a spot near the lower end of the cell, a series of spots outside the cell, one between each pair of the nervules, the lowest the largest and oblong, the second less than half the size and round, the third small and linear, all lilac-white. *Hindwing* with a spot in the cell and a series of four or five spots outside it, all lilac-white; sometimes a row of minute submarginal white dots, almost obliterated in the *forewing*.

In a series of the MALES in Colonel Lang's collection, all from Sikkim, the subcostal spot on the upperside of the *forewing* is wanting in some specimens; in others there is a faint cell spot, and in two or three specimens there is a fourth spot between the first and second median nervules. The *hindwing* in all is strongly tinged rufescent, the base and middle darker and faintly shot with blue, the *forewing* alone being black. In one specimen the apical portion of the forewing is distinctly powdered with pale blue in broad streaks between the nervules.

FEMALE (separately described as *E. poyei* by Felder). "UPPERSIDE: *Forewing* deep rufescent swarthy, a little paler on the apical area and margin, in certain positions splendid violet blue almost to the margin; with a subcostal dot, another in the cell, and two median spots (the lower powdery, evanescent) white, margined with violet. *Hindwing* less intense and paler on the margin, with the costal margin paling and powdered with hoary; with small obsolete external spots in a subangulate series, and others before the outer margin dot-shaped, powdered with white, a little more distinct, on a paler ground. UNDERSIDE much paler, the usual spots at the base. *Forewing* with a subcostal spot, another in the cell, two beyond it (the upper narrow, minute—the lower small), two lower, small; and others, before the outer margin, white, more or less powdered with blue, and circled with swarthy; a rather large median spot, and two long internal ones (the upper almost linear), violet-white. *Hindwing* with a spot in the cell, and five beyond it in an angulate series, small, violet-white and circled with swarthy; the external spots, and others before the margin as on the upperside, but whitish and larger." (*Felder*, l. c.)

There can be little doubt but that this is the female of *E. deione* which is found more commonly in the same localities, and the female of which is otherwise unknown. A pair of FEMALES in Colonel Lang's collection agree with this description, except that the *upperside* of the *forewing* has, in one specimen, a fifth spot, shaped like a very small streak, below the first median nervule. On the UNDERSIDE, in the *forewing*, the spot in the cell is double, the inner margin is whitish, a long whitish streak below the median nervure, a large oval spot above it, a prominent round spot above that, a minute streak above again at end of cell, and a subcostal spot, are all the markings. There is no trace of any spots beyond the discal row. On the UNDERSIDE of the *hindwing* there are the following markings: a spot in the cell, a series of six round the end of the cell, that nearest the costa smallest, and the next to it the largest; four small submarginal spots near the anal angle, and nine small marginal spots from the anal angle (two between each pair of nervules in each row); the *cilia* prominently white-spotted.

74. **Euploea limborgii,** Moore.

E. limborgii, Moore, Proc. Zool. Soc. Lond., 1878, p. 823, pl. li, fig. 2, *male*.

HABITAT: Upper Tenasserim, Mergui.

EXPANSE: 3·75 to 4·40 inches.

DESCRIPTION: "Allied to *E. deione* from northern India. UPPERSIDE differs in the *forewing* having some very indistinct submarginal white spots, and the *hindwing* having two marginal rows of prominent white spots, similar to, but smaller than, those in *E. margarita*." (*Moore*, l. c.)

MALE: UPPERSIDE: *Forewing* bordered with dark rufous, the rest of the wing velvety black, with a rufous tinge in some positions, in others, splendid shining blue. A broad and very long silky impressed streak on the interno-median area; and a few indistinct marginal dots near anal angle, sometimes entirely wanting. The inner margin slightly convex. *Hindwing* brown along the median nervure it is suffused darker, and faintly shot with blue on the darkest part; a submarginal row of increasing spots, round at apex, and elongate towards anal angle, and a marginal row of increasing spots, smaller and rounded throughout: in some specimens both rows are complete, prominent, and pure white; in others the spots are smaller, powdered with brown, and obsolescent at apex. UNDERSIDE brown, darkest along median nervure of *forewing*. *Forewing*, with the inner margin pale and whitish, a subcostal spot above the end of the cell, one in the cell, and two discal (the upper one a very small streak), violet-white, a prominent oval white spot between the first and second median nervules, and a few small white marginal and submarginal spots, sometimes entirely wanting. *Hindwing*, with the border rows of spots as on upperside, white; and a spot in the cell, and five small ones round the end of the cell, pale violet: the usual white basal dots. FEMALE: UPPERSIDE, as in the male, but the sexual streak is absent; the inner margin of *forewing* is straight, and a single minute white spec is apparent on the disc between the first and second median nervules. *Hindwing* identical, except that the border spots are as a rule more prominent, the inner row rather more elongated. UNDERSIDE exactly as in male, except that there is a conspicuous lengthened violet-white streak on the interno-median area of *forewing*.

E. limborgii is common in Upper Tenasserim from February till April, and perhaps at other seasons. It was found by Limborg at Ahsown, 2,000 feet above the sea, above Ahsown, at Hatsiega, and at the Houngduran source. Captain C. T. Bingham found it in the Meplay valley in February, between Meeawady and Kankarit, and in the Thoungyeen forests in March, and in the Donat range and the Thoungyeen forests in April. Dr. J. Anderson took three males and a female in December, and one male in March in the Mergui archipelago. It flies lazily in open cultivation and scrub jungle.

E. pinwilli, described by Butler from Malacca, appears to be identical with this species, and if so, Butler's name would have the priority; but in the absence of specimens of *E. pinwilli* the point cannot be determined; the original description of *E. pinwilli** is appended.

Seventh Group.—STICTOPLŒA, *Butler*. "MALES for the most part with straight inner margins like the females; always with two well-defined sericeous brands on the interno-median area, and placed one above the other." (*Butler*, Journ. Linn. Soc., Zoology, vol. xiv, p. 301, 1878).

The males of the Indian species have the inner margin of *forewing* bowed and quite distinguishable from those of the females; but the double sericeous brand is a well-marked character.

* *E. pinwilli*, Butler. HABITAT: Malacca. EXPANSE: 4 inches. DESCRIPTION: "*Forewing* brownish piceous, purple-shot, slightly paler along the external border: a long sericeous interno-median streak. *Hindwing* paler brown, deepest at base; two marginal series of whitish spots, clear at anal angle, obsolescent and decreasing towards apex; costal area greyish. UNDERSIDE: *Forewing*, paler than above, with a subcostal spot, and an elliptical interno-median spot, pinky white; a spot in the cell, and two beyond it, bluish-white, two or three white dots at external angle. *Hindwing*, with the submarginal spots clear whitish; a spot in the cell and seven in an arched series beyond it, lilacine whitish; base and pectus white spotted. *E. pinwilli* is allied to *E. menetriesii*, but larger, darker, and shot with purple." (*Butler*, Trans. Linn. Soc., Zoology, second series, vol. i, p. 535, pl. lxix, fig 9, 1876, where the name is spelt *E. pinwillii*).

None of the species are common; one species occurs in Burma; three closely allied and doubtfully distinct species are described from N.-E. India; one is found in south India, and another distinct species is found only in Ceylon. The Burman species is very distinct, with the *forewing* splendidly shot with blue, no spots on the disc, and a double marginal series of white spots on the hindwing. The N.-E. Indian species has the forewing with numerous paler blue spots on the disc, and but few marginal spots on the hindwing; the Ceylon species lacks the splendid blue shot; but both these have the two sericeous bands large and well defined as in the *Euplœas* of the *alcathoë* and *deione* types. *E. coreoïdes*, the south Indian form, has almost exactly the colouration of *E. core* and *E. asela*, and strangely enough, like them, has the sexual brands smal. and inconspicuous.

Key to the Indian species of Stictoplœa.

C. *c.* Males with two well-defined brands on the interno-median area of the forewing.

a.[1] Upperside dark velvety olive-brown, palest externally, with a double row of whitish spots along the border of both wings as in *E. core*.

75. E. *(Stictoplœa)* COREOÏDES, S. India.

b.[1] Upperside deep rufescent swarthy, tinged with violet on basal area; border spots of forewing evanescent or wanting.

76. E. *(Stictoplœa)* MONTANA, Ceylon.

c.[1] Upperside forewing shot with vivid blue.

a.[2] With no discal spots on forewing.

77 E. *(Stictoplœa)* GROTEI, Tenasserim.

b.[2] With numerous discal spots on forewing.

78. E. *(Stictoplœa)* HOPEI, N.-E. India.

79. E. *(Stictoplœa)* BINOTATA, N.-E. India.

80. E. *(Stictoplœa)* MICROSTICTA, N.-E. India.

In the Lepidoptera of Ceylon, p. 13, Moore has taken *E. coreoïdes* as the type of yet another genus, which, under the name of *Narmada*, he characterises as follows:—"Forewing elongated, triangular; costa slightly arched; apex somewhat acute; exterior margin oblique; posterior [inner?] margin in male slightly convex, with two sericeous streaks between the median and submedian nervures: hindwing triangular." In what way this is supposed to differ from *Stictoplœa* of Butler, or why Butler's name for this section has been dropped, there is apparently nothing to show. The one single definite expression in the description, namely, the presence of two sericeous brands in the male, is precisely the point on which Butler's prior designation is founded.

75. Euplœa coreoïdes, Moore.

E. coreoïdes, Moore, Ann. and Mag. Nat Hist, fourth series, vol. xx, p. 44 (1877).

HABITAT: Malabar, Nilgiris, Wynaad, Trevandrum.

EXPANSE: ♂, 3·25 to 3·60; ♀, 3·50 inches.

DESCRIPTION: "Allied to *E. core* (which is also found in the same locality), but distinguished by the two elongated silky impressed marks in the male, the male of *E. core* having but a single short narrow mark. MALE and FEMALE, dark velvety olive-brown, palest externally. MALE: UPPERSIDE: *Forewing*, with a prominent submarginal and marginal series of small white spots; two elongated silky impressed marks between first median nervule and submedian nervure. *Hindwing*, with broader series of white oval and rounded submarginal and smaller rounded marginal spots. UNDERSIDE paler; marginal spots as above; both wings with a small white spot at the end of the cell, and contiguous series beyond. FEMALE, with marginal spots as in male, the submarginal series on *both wings* above, and the discal series on *forewing* beneath, being larger." (*Moore*, l. c.)

The female of this species is so slightly different from the same sex of *E. core* that it is only by the following points they can be distinguished: First, by the outline of the forewing being more entire; in *E. core* it is slightly but perceptibly scalloped. Second, on the underside of the forewing having a complete series of six spots, one between each pair of nervules outside the cell; in *E. core* two of these spots, those above the discoidal nervules, are always wanting.

Third, the two brands on the interno-median area of the upperside of the forewing in the male are faintly, but still quite perceptibly, to be traced in the female in the same position. These three points of difference are constant in the three female specimens before us—one from Bangalore, one from Ootacamund, and the third from Trevandrum. It is just possible that with a larger series of females some might be found with one or more of the discal spots wanting, but the outline of the forewing is probably an unvarying character of this species, as it is very perceptible in all the males we have seen.

E. coreoïdes appears to be confined to south India, and is not common. Mr. H. S. Ferguson has sent us two specimens taken near Trevandrum on the 2nd May; and the Indian Museum has two specimens taken at Conoor in August, also specimens taken at Bangalore and Ootacamund. A Trevandrum female shews an approach to the Ceylon *E. montana* in the marginal series of spots on the *forewing* becoming obsolescent.

76. **Euploea montana**, Felder.

E. consimilis var. *montana*, Felder, Reise Nov., Lep, vol. iii, p. 330, n. 454 (1865); *Euploea lankana*, Moore, Ann. and Mag Nat. Hist., fourth series, vol. xx, p. 44 (1877); *Stictoplœa lankana*, Butler, Journ. Linn. Soc., Zoology, vol. xiv, p 302 (1878); *Narmada montana*, Moore, Lep. Cey., p. 13, pl. vi, fig. i (1880), *male*.

HABITAT: Ceylon.

EXPANSE: 3·0 to 3·95 inches.

DESCRIPTION: MALE: "Allied to *E. consimilis** from Java, but larger, wings broader, and spots smaller, those before the margin of the *forewing* evanescent. FEMALE: UPPERSIDE: *Forewing*, with the pale border broader, two subcostal violet spots, the interior depressed spots much narrower, more obsolete. *Hindwing* with larger spots. UNDERSIDE: Both wings almost as in the male, but the *forewing* with the spot as on upperside before the middle of the costa, and another beyond the lowest disco-cellular nervule, minute." (*Felder*, l. c.)

The following more detailed description of this species is given by Moore in the "Lepidoptera of Ceylon:—"

"MALE and FEMALE: UPPERSIDE dark velvety olive-brown, paler externally. *Forewing* with a submarginal and marginal row of very small indistinct ochreous-white spots. MALE with two elongated sericeous streaks between the first median nervule and submedian nervure. *Hindwing* with a submarginal and marginal row of ochreous-white spots, the former oval from the anal angle and duplex anteriorly, the latter smaller and round. UNDERSIDE paler, marginal white spots as above, those on forewing more prominent, both wings with a small white spot at end of the cell, and a contiguous discal curved series beyond. *Body* blackish; thorax, head, palpi, and abdomen beneath, white-spotted; forelegs white streaked beneath."

"Captured at Rambodde, Galle, and Kandy." A single specimen, the only one we have seen, sent to us by the Hon'ble F. Mackwood from Ceylon, has the spots of the forewing almost entirely obsolete on the upperside; the shape of the forewing, and its dark velvety almost entirely unspotted appearance, distinguish this species from the south Indian *E. coreoïdes* at a glance.

77. **Euploea grotei**, Felder.

E. grotei, Felder, Reise Nov., Lep., vol. ii, p. 339, n. 470, pl. xli, fig. 7 (1865), *female*; *Euploea grotei*, Butler, Trans. Linn. Soc., Zoology, second series, vol. i, p. 535 (1876); *Stictoplœa grotei*, id., Journ. Linn. Soc., Zoology, vol. xiv, p. 302 (1878).

HABITAT: Cochin, Mergui, Upper Tenasserim, Malacca.

EXPANSE: 3·2 to 4·2 inches.

DESCRIPTION: "MALE: UPPERSIDE: *Forewing* blackish-chestnut and, except on outer margin which is paler, vivid violet-blue in certain positions; a [two ?] rather long interior silky

* *E. consimilis*, Felder. HABITAT: Java. EXPANSE: not given. DESCRIPTION: "MALE: UPPERSIDE. *Forewing* deep rufescent swarthy, and, except on the external border, which is widely and increasingly much paler, faintly tinted with violet in certain positions; the two usual silky internal spots; submarginal spots in a bent series, and dots before the margin, increasing, white. *Hindwing* paler, paling beyond the cell, the anterior area with the usual powdery appearance; and with a costal vitta somewhat pearly white; submarginal spots rather large, increasing, and others before the margin smaller, white, powdered with brown. UNDERSIDE, much paler, the basal dots white, the marginal spots of the upperside but whiter and a little larger. *Forewing* darker about the median nervure, with two elevated interior spots as usual; the internal margin pearly-hoary; with a subcostal spot, two beyond it, and three in the disc, violet-white. *Hindwing* with a spot in the cell, and seven others small around the end of the cell, violet-white." (*Felder*, Reise Nov., Lep, vol ii, p. 329, n. 454, 1865).

spot [s ?] and some small chalky-white dots before the outer margin. *Hindwing* paler, in certain positions suffused with violet; the external margin broadly and increasingly much paler; the anterior area powdery, with the usual somewhat pearly costal band; external spots irregularly elongate-oval, and others before the margin smaller, increasing, chalky-white; the uppermost, except where obsolete, best defined, the lowest and last but one of the external row blending with the lowest and last but one of the marginal spots. UNDERSIDE much paler, with the usual basal dots. *Forewing* a little darker in the disc; a subcostal spot, and two discal (one in the cell) small, violet-white; an elongate median spot, and others before the lower outer margin, chalky-white; the usual interior elevated spot, and internal band somewhat pearly, pale at base. *Hindwing* with a spot in the cell, and six outside unequal (the second small), violet-white, encircled with swarthy; the marginal spots as on the upperside but larger, and all best defined on the underside. FEMALE: UPPERSIDE: *Forewing* almost to the margin in certain positions vivid violet-blue; small submarginal spots and dots before the margin pale violet-blue, powdered with white. *Hindwing* darker, and in certain positions more suffused with violet than in the male, the costal margin much paler, with a concealed somewhat pearly band; the submarginal spots rather large, and others before the margin smaller, white, purer than in the male. UNDERSIDE much paler, basal dots white. *Forewing* with a subcostal spot, two beyond it (the lower narrow, minute), and three rather large, discal (one in the cell) on a darker base, bluish-white, circled with blackish; small increasing submarginal dots, and others small before the margin, circled with swarthy, and a rather long violet-white interior linear spot; the inner margin pearly-hoary. *Hindwing* with a rounded spot in the cell, and six others in an angulated row beyond it, violet-white, small; the marginal spots as on upperside." (*Felder*, l. c.)

A single specimen of a *Stictoplœa*, which apparently belongs to this species, was sent by Captain C. H. E. Adamson, from Upper Tenasserim, where it was taken on the 11th February, 1881. It is a male, and differs somewhat from Felder's original description. The *forewing* is shining violet-purple over the whole area to the extreme outer margin, and bears a complete submarginal series of rather small, but prominent violet spots, with a series of smaller marginal spots of the same colour obsolete near the apex; in the *hindwing* the outer border is scarcely perceptibly paler, and the double series of white spots is complete, the outer being rounded or slightly angulate, the inner larger, oval. On the UNDERSIDE the markings correspond exactly with the description, but there is in addition a violet spot on the *forewing* beyond the cell, and above the upper discoidal nervule. It differs from *E. hopei* on the *forewing* in the entire absence of discal spots, and on the *hindwing* in the presence of the double complete series of white spots. Another specimen (male) was subsequently taken at Moulmein by Captain Adamson, feeding at a flowering tree in company with numerous other *Euplœas*, including *E. godartii*, *E. crassa*, *E. masoni*, *E. alcathoë*, and *E. margarita*; and subsequently numerous specimens were taken in the autumn in the Thoungyeen forests, by Captain C. T. Bingham, including one female. These specimens vary much in size, but all agree with the first specimen taken by Captain Adamson, and there can be no doubt that they are the *E. grotei* of Felder. Dr. J. Anderson took one male in January, and two in March in the Mergui archipelago.

The FEMALE only differs from the male in the absence of the sexual marks, and the straight inner margin of the forewing.

78. **Euplœa hopei**, Felder. (PLATE IX, FIG. 18 ♂ ♀).

E. hopei, Felder, Reise Nov. Lep., vol. ii, p. 328, n. 452 (1865); *Stictoplœa hopei*, Butler, Journ. Linn. Soc., Zoology, vol. xiv, p. 302 (1878).

HABITAT: N.-E. India, Sikkim, Naga Hills, Cachar.

EXPANSE: 3·8 to 4·3 inches.

DESCRIPTION: "MALE: UPPERSIDE: *Forewing* chestnut-swarthy, and in certain positions vivid violet-blue; the two usual silky interior spots, a spot within the cell, two median, one subcostal, three beyond the cell, and seven or eight others, larger, submarginal, in a bent series, and from two to six dots before the outer margin, violet-bluish. *Hindwing* deep swarthy, and,

except on the paler border, suffused with violet in certain positions; the anterior area with a paler ground, and a concealed pearly whitish costal vitta; submarginal spots white, small, often evanescent, and others before the outer margin obsolete, most frequently entirely absent. UNDERSIDE pale swarthy. *Forewing* with an internal hoary streak, and the two usual internal elevated spots; the subcostal spots, and three discal of the upperside on a darker ground (the lower median one much larger), small submarginal spots in a bent series, and dots before the outer margin, violet-white, circled with blackish swarthy. *Hindwing*, with white basal dots, a spot within the cell, and five or six beyond around it, minute, violet-white, circled with swarthy; the submarginal spots, and dots more or less large before the lower outer margin, white." (*Felder*, l. c.)

Specimens from Sikkim in Colonel Lang's collection have the *forewing* on the upperside deep rufescent swarthy, shot throughout with bright violet-blue; a spot in the cell at end, a small subcostal spot, sometimes absent, an angulate row of four or five discal spots round end of cell, a submarginal row of seven spots, and a few marginal spots from hinder angle, pale violet-blue. The discal and submarginal spots large, especially the latter. *Hindwing* rufescent fuscous, paler than *forewing*, paling towards the margin, faintly shot with violet-blue at the base; the costal margin broadly whitish; a faint indication from the apex of an obsolete submarginal series of white dots. In some specimens this series of spots is very conspicuous, pure white, and not quite reaching the anal angle.

The male only differs from the female in having two long impressed silky streaks on the *forewing*, and the inner margin convex instead of straight; in the *hindwing* of the MALE the submarginal series of spots is almost altogether obsolete; in that of the FEMALE it is rather more prominent. UNDERSIDE paler, rufescent fuscous, darker in the middle of the forewing. *Forewing* with the inner margin broadly white; all the spots of the upperside are represented but smaller, especially in the submarginal row; in the discal series the second from the costa is minute, the third scarcely visible, the fourth large and square, the fifth large and oval. *Hindwing*, with small violet-white dots, a few at the base, one in the cell at end, five discal round the end of the cell smallest towards the costa, three or four submarginal from costal end, one between each pair of nervules, and nine marginal from anal angle, two between each pair of nervules. These two latter series of spots are very variable, in some specimens they are almost complete right round the outer margin of the wing. The female has a bluish-white streak on the interno-median area. In a female specimen from Cachar the submarginal row of spots is very large and white-centred, the discal series is also complete from costa to internal nervure. Mr. Wood-Mason took two pairs in Cachar in June.

The figure is taken from a male and female, showing the upperside, from Sikkim. The specimens are in the Indian Museum, Calcutta.

The two following species have recently been separated by Butler, but the characters on which he bases his distinctions are so excessively variable that it is doubtful whether the separation can ultimately be maintained.

79. Euplœa binotata, Butler.

Stictoplœa binotata, Butler, Journ. Linn. Soc., Zoology, vol xiv, p. 302, n. 7 (1878); *Euplœa callithoë*, Butler, (*nec* Boisduval), Proc. Zool. Soc. Lond., 1866, p. 272, n. 10.

HABITAT: Sikkim, Sylhet, N. and E. India, Borneo.

EXPANSE: 4·2 inches.

DESCRIPTION: "MALE and FEMALE: *Forewing* quite as in [*E.*] *S. hopei*, Felder. *Hindwing* with only two white subapical points, all the other spots obsolete. This is the *E. callithoë* of my Monograph, but not of Boisduval." (*Butler*, l. c.)

This is recorded here on Butler's authority as a distinct species, but the single character given in his description as distinguishing it from *E. hopei* is one so variable in the latter species that a distinction based on it should only be accepted with caution, especially when, as in this case, both species occur in the same localities. These remarks apply equally to the following species, *E. microsticta*.

80. **Euplœa microsticta,** Butler.

Stictoplœa microsticta, Butler, Journ. Linn. Soc. Lond, Zoology, vol. xiv, p. 302, n. 6 (1878); id., Trans. Ent. Soc. Lond, 1879, p. 7.

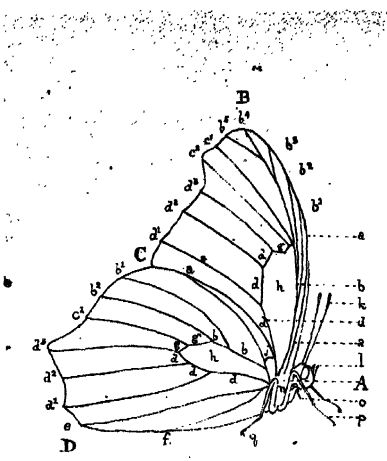
HABITAT: Cachar.

EXPANSE: 4·2 inches.

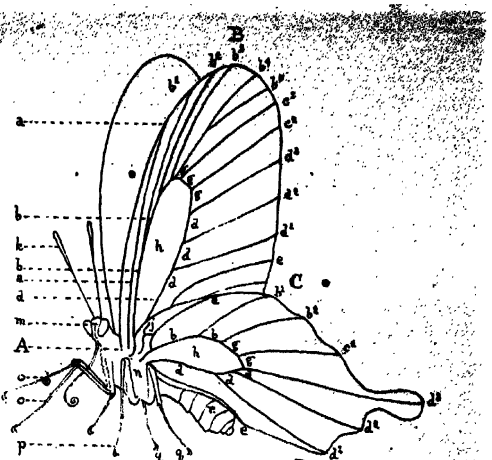
DESCRIPTION: "UPPERSIDE: *Forewing* like [*E.*] *S. hopei*, except that it is larger, all the spots are considerably smaller, and the purple shot is less vivid. *Hindwing* with only the three first of the discal series of white spots." (*Butler*, l. c.)

A species of *Euplœa*, *E. magnifica*,* has been described from Thibet. It is not clear to which group it should be referred, and Butler makes no mention of it in his revision of the genus *Euplœa*, subsequently published. The description is subjoined for reference.

* *E. magnifica*, Butler. HABITAT: Thibet. EXPANSE: 4 inches. DESCRIPTION: "Female? Wings above bright sepia brown. *Forewing* shot with vivid blue; subapical area densely irrorated with lilacine; a conspicuous subcostal white spot, a second within discoidal cell, and a third on second median interspace, forming together a triangle; a minute whitish point on lower discoidal interspace, and another on first median interspace. *Hindwing*, with a double series of ill-defined, disco-submarginal, pale-ochraceous spots from third median nervule to anal angle. *Body* black, white spotted in front. UNDERSIDE, rich chocolate-brown. *Forewing*, with three white spots as above, a fourth oval spot on first median interspace; a small point between lower discoidal, and third median nervules, a subapical point, one submarginal on second median interspace, five nearly marginal points from the third median nervule to the external angle, and some anal-marginal dots on the fringe, whitish. *Hindwing*, with a spot near end of cell, and five unequal spots in a semicircle round extremity of cell, pearly-white; a double submarginal series of yellowish white spots; fringe dotted with whitish. *Body* black, thorax white-spotted." (*Butler*, Trans. Ent. Soc. Lond., 1874, p 423).



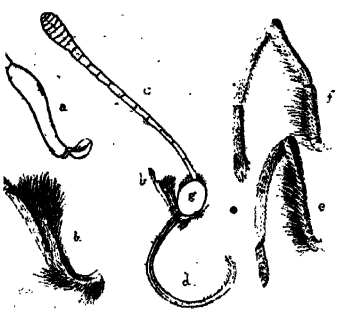
MELANITIS ISMENE



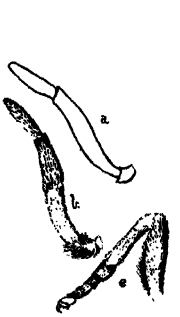
PAPILIO ARISTOLOCHIÆ.

OUTLINE FIGURES.

a, costal nervure. b, subcostal nervure. b¹, b², b³, b⁴, b⁵, subcostal nervules. c¹, c², discoidal nervules. d, median nervure. d¹, d², d³, median nervules e, submedian nervure. f, internal nervure. g, discocellular nervules. h, discoidal cell. j, præcostal nervure k, antennæ. l, labial palpi. m, eye. n, thorax. o, forelegs (minute in Melanitis). p, midlegs. q, hindlegs. A, base of wings. B, apex of forewing. C hinder angle of forewing and apex of hindwing. D, anal angle of hindwing. A, B, costal margin of forewing, or, costa. B, C, outer margin of forewing. A, C, inner margin of forewing, or, costa of hindwing. C, D, outer margin of hindwing. D, A, inner margin of hindwing, or, abdominal margin.



JUNONIA ASTERIE.



MYRINA JAFFRA.

ELYMNIAS UNDULARIS.

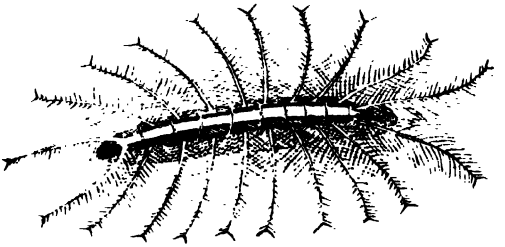
MELANITIS LEDA.

LAMPIDES ÆLIANUS.

PAPILIO AGAMEMNON.

DISSECTIONS. a, palpi denuded of scales. b, palpi. c, antennæ. d, proboscis. e, foreleg of male. f, foreleg of female. g, eye. 1, coxa. 2, femur. 3, tibia. 4, tarsus. 5, ungues, or, claws (highly magnified).

ATHYMA LEUCOTHOE



ADOLIAS GARUDA.

AMBLYPODIA HIMCLEA

HEBOMOIA GLAUCIPPE

PAPILIO POLYTES

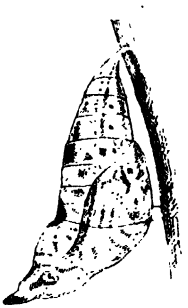
ISMENE OEDIPODIA

TYPICAL CATERPILLARS.

ATHYMA LEUCOTHOE

ADOLIAS TABRONINA

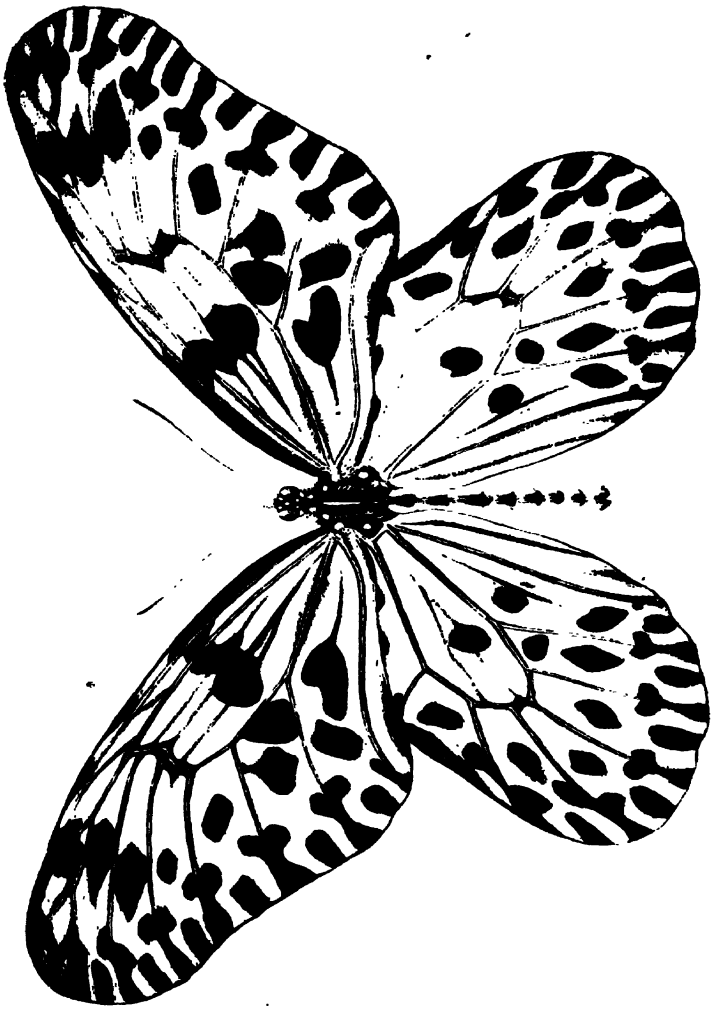
AMBLYPODIA [illegible]

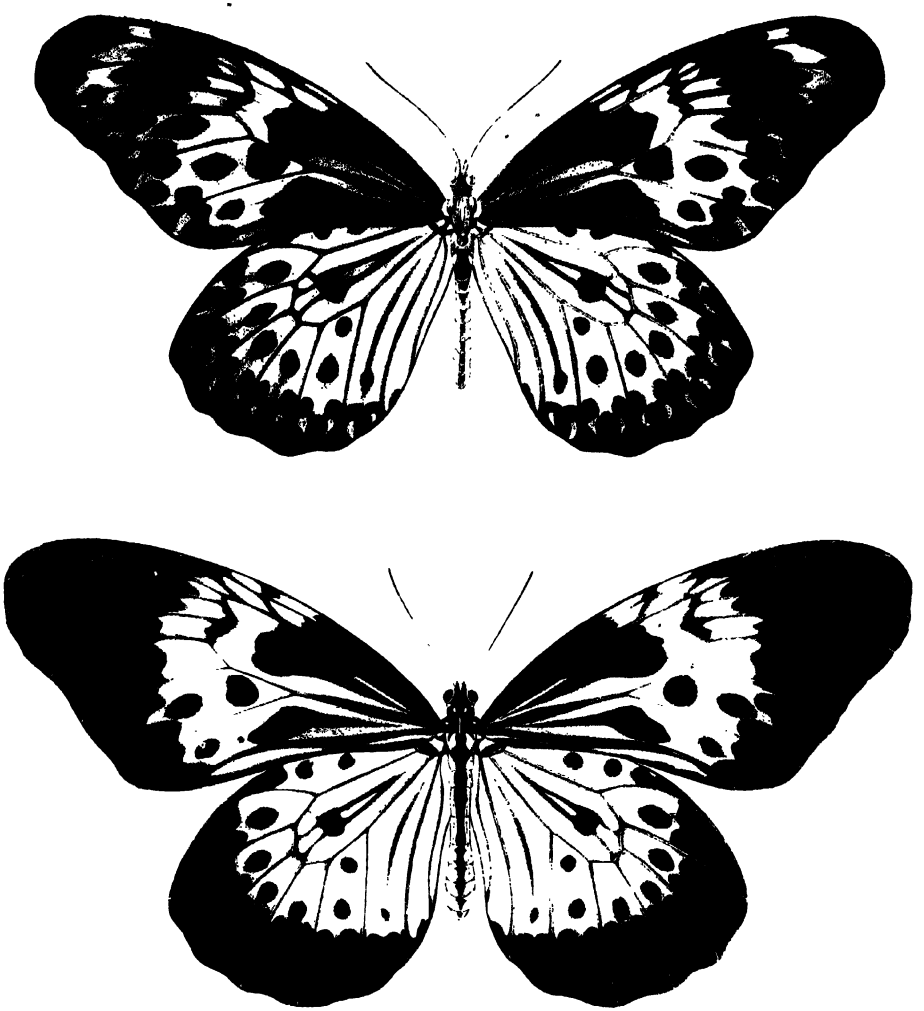


HEBOMOIA GLAUCIPPE

PAPILIO POLYTES

ISMENE OEDIPODIA





W.-M. & de N.

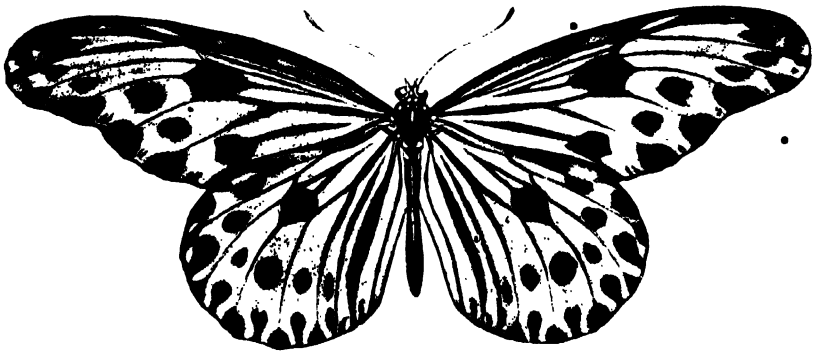
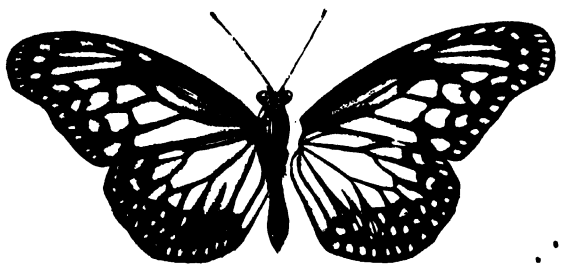
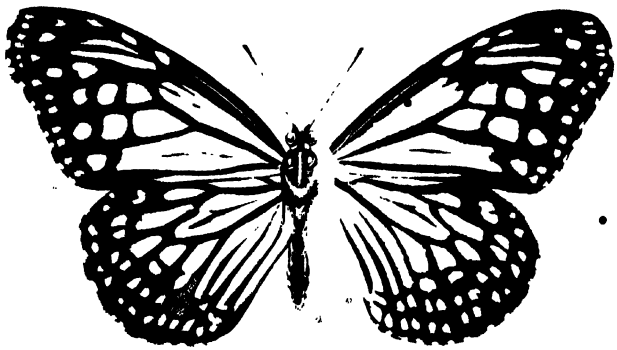
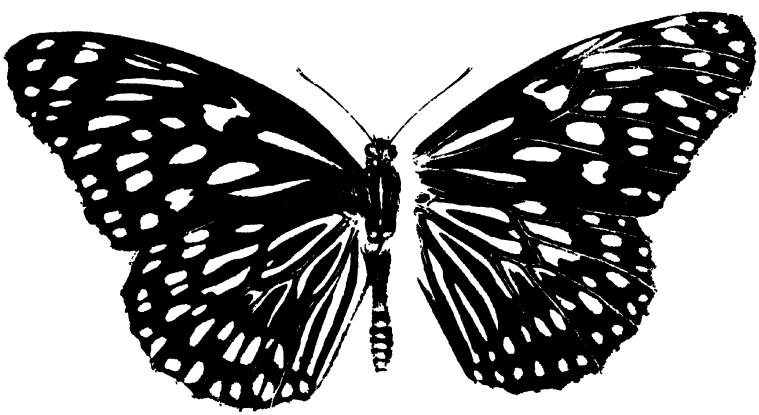


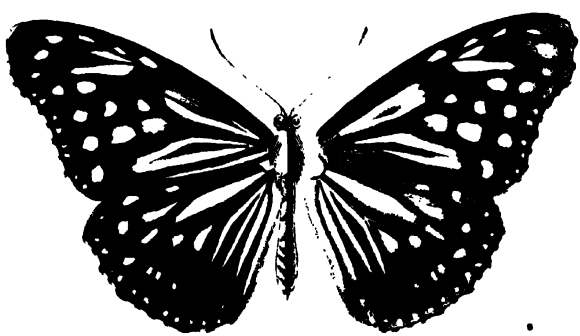
Fig. 1. [illegible]

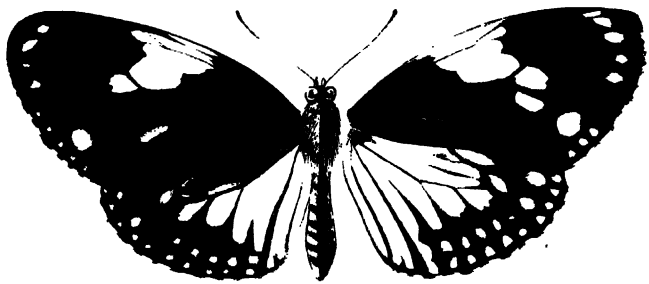
Fig. 2. [illegible]

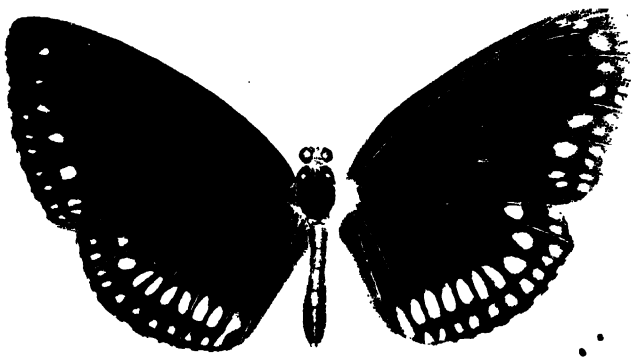




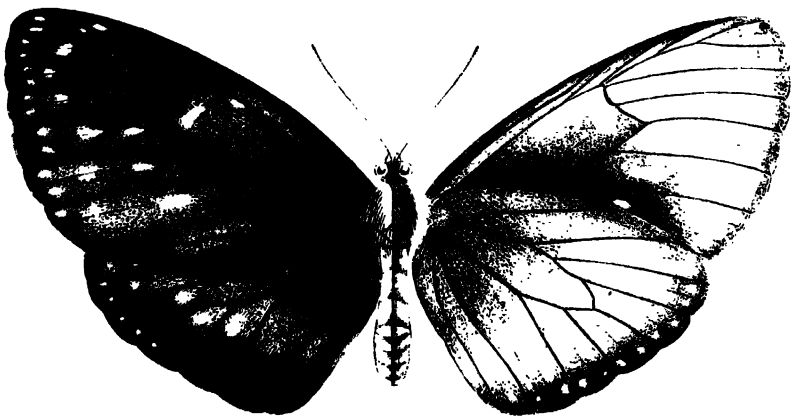








ECPTICA (SALPINX) SINHALA, Moore



STAJ - TAMPERE